



# Sabajo Project

## *Draft Environmental and Social Impact Assessment*

### VOLUME B: ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

March 2018

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March 2018

# SABAJO PROJECT

## ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### SOCIAL MANAGEMENT PLAN

Report No. 1669326



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## Abbreviations and Units of Measure

Abbreviation	Definition
ASM	artisanal and small scale mining
CH	Community Health
CP	Contracting and Procurement
CRP	Closure and Reclamation Plan
CW	Culture and Wellbeing
ER	Employment and Recruitment
ESIA	Environmental and Social Impact Assessment
FPIC	Free, Prior and Informed Consent
GoS	Government of Suriname
HIV	Human Immunodeficiency Virus
HR	Human Rights
ICMM	International Council on Mining and Metals
IFC	International Finance Corporation
km	kilometer
KPI	Key Performance Indicator
LU	Land Use
Newmont	Newmont Suriname, LLC
OT	Ongoing Training
SMP	Social Management Plan
SR	Social Responsibility
STI	sexually transmitted infection
the Project	the Sabajo Project
TM	Traffic Management
WRF	waste rock facility

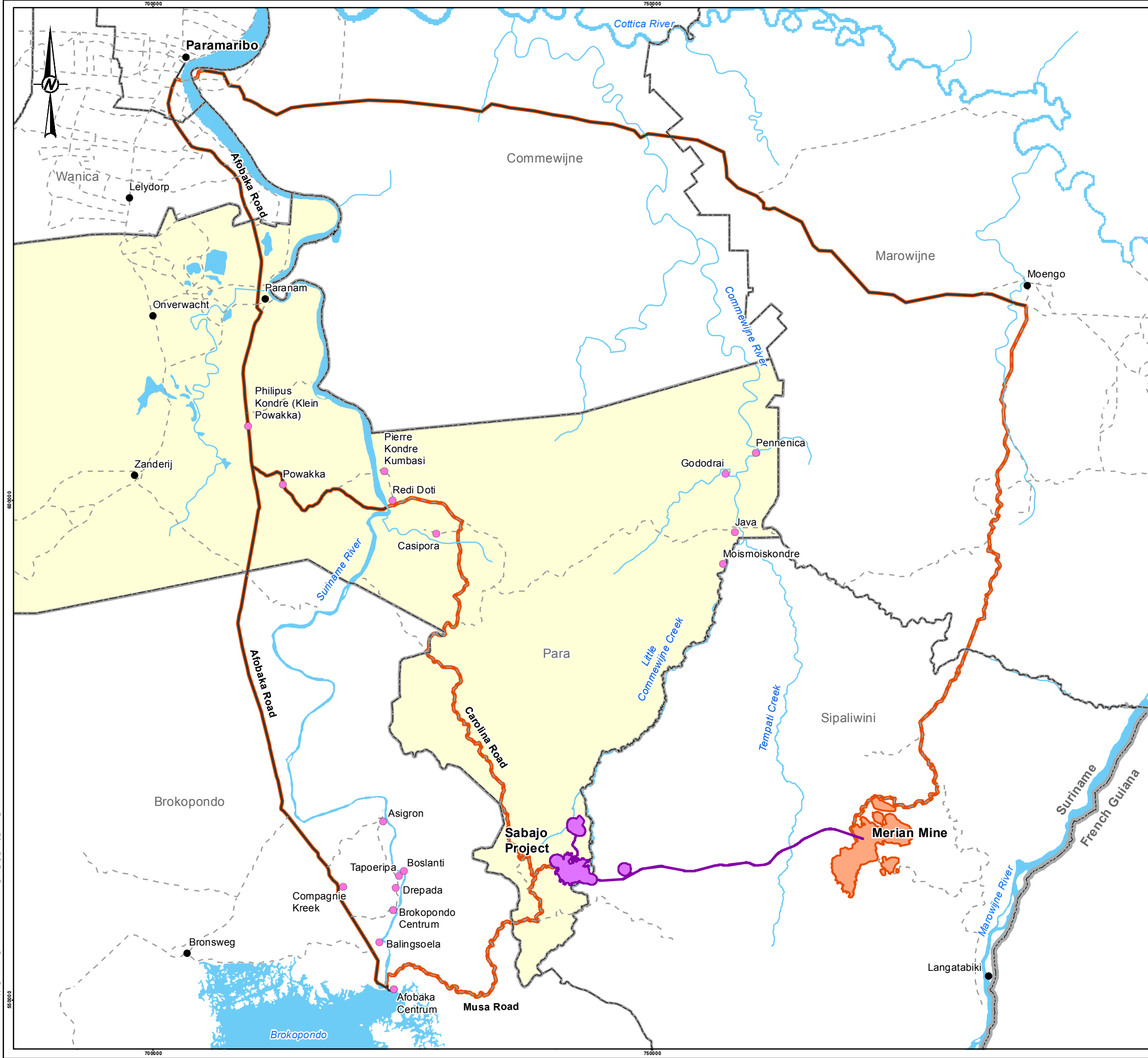
## 1 INTRODUCTION

The Sabajo Project (the Project) is located in the northeastern part of Suriname, approximately 100 kilometers (km) south of Paramaribo and accessed via the Afobaka Road or the Carolina Road (Figure 1-1). The Project site is located in the Commewijne watershed in a largely undeveloped part of Suriname. The nearest community, approximately 37 km southwest the Project site by road, occurs at Afobaka Centrum, an administrative and business center with a population of less than 300 people. The area immediately surrounding the Project has been modified to a significant degree by logging and artisanal and small scale mining (ASM).

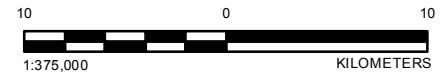
The proposed Project consists of the development of a gold mine with planned production of approximately 613,000 ounces of gold with removal of 140 million tons of waste rock. Mining will take place over 10 years and the processing of ore will take place at the Merian mill located approximately 30 km to the east (Figure 1-1). Exploration within the proposed Right of Exploitation will continue throughout operations. The additional Santa Barbara and Margo deposits are located north and east of the Project, respectively. As there will be no processing at Sabajo, the construction and operation of the Project requires the development of minimal supporting infrastructure, which includes waste rock facilities (WRFs), an ore stockpile, a camp, offices and a maintenance shop, and an approximately 30 km haul road connecting the Project with the Merian mine.

This document presents the Social Management Plan (SMP) for the Project. The Plan includes the following components:

- objectives of socio-economic management;
- principles and Newmont's corporate standards;
- mitigation and benefit enhancement measures identified in relation to Project impacts;
- human rights management;
- summary of the relationship between Project impacts, mitigation, benefit enhancements, and standards;
- social aspects of mine closure;
- role of engagement;
- monitoring; and
- implementation of the SMP.



- LEGEND**
- STUDY AREA COMMUNITY
  - OTHER COMMUNITY
  - DISTRICT BOUNDARY
  - - - INTERNATIONAL BOUNDARY
  - PAVED ROAD
  - - - UNPAVED ROAD
  - WATERCOURSE
  - WATERBODY
  - POTENTIAL PROJECT ACCESS ROUTES
  - SABAJO PROJECT PHYSICAL IMPACT AREA
  - MERIAN MINE EXISTING AND APPROVED FOOTPRINT



**REFERENCE(S)**  
 BASE DATA AND TOPOGRAPHY PROVIDED BY NEWMONT.  
 DATUM: WGS84 PROJECTION: UTM ZONE 21

**CLIENT**  
 NEWMONT SURINAME

**PROJECT**  
 SABAJO PROJECT ESIA

**TITLE**  
 SABAJO ACCESS ROUTES

CONSULTANT	YYYY-MM-DD	2018-03-01
DESIGNED	JP	
PREPARED	PT	
REVIEWED	GJ	
APPROVED	GJ	

PROJECT NO. 1669326 CONTROL REV. 0 FIGURE 1

PRT:H:\20161669326\Maping\MapManagement\Plans\FINAL\1669326\_MAN\_Fig1\_Sabajo\_Access\_Route.mxd PRINTED ON: 2018-03-01 AT: 3:46:07 PM

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## 2 OBJECTIVES OF SOCIO-ECONOMIC MANAGEMENT

The main objectives of socio-economic management for the Project are to:

- Mitigate the negative effects and enhance the benefits (creating value) of the Project for all relevant stakeholders;
- Create opportunities for Project stakeholders to participate in the Project where possible;
- Establish a role for Newmont Suriname, LLC (Newmont) as an active participant in the sustainability of affected communities;
- Identify socio-economic effects as they evolve, and implement responsive social management initiatives together with the affected stakeholders; and
- Maintain goodwill and positive relationships with Project stakeholders.

## 3 NEWMONT CORPORATE POLICIES AND STANDARDS

Newmont's corporate policies and standards that are applicable to social management include:

- Employee and Supplier Codes of Conduct;
- People Policy;
- Health and Safety Policy;
- Local Procurement and Employment Standard;
- Stakeholder Relationship Management Standard;
- Social Baseline and Impact Assessment Standard;
- Community Investment and Development Standard;
- Indigenous Peoples Standard;
- Land Acquisition and Involuntary Resettlement Standard; and
- Human Rights Standard.

The following sections summarize these standards and policies by topic area to provide a cohesive discussion of Newmont's approach to managing social aspects of their operations.

Where human rights risks are identified, there is emphasis on avoiding the potential for negative impacts to rights, and the human rights mitigation measures strengthen this aspect of the mitigation hierarchy being applied.

### 3.1 Workforce Management and Engagement

Newmont's employee and supplier **Codes of Conduct** (Newmont 2017a) is an educational and preventative tool implemented to ensure that employees follow the law, and Newmont's policies and standards. The Code sets expectations of behavior for employees, business partners, vendors and contractors working for Newmont, and outlines standards around health and safety, sustainability, workforce management, and interaction with stakeholders. The Code is overarching, influencing all areas of mitigation and benefit enhancement, and in particular those identified in Sections 4.4, 4.5, 4.6, and 4.8 below, and in Sections 5.9.7, 5.9.8, 5.9.9 and 5.9.12 of the Environmental and Social Impact Assessment (ESIA).

Newmont's **People Policy** (Newmont 2014a) guides the treatment of employees. The Policy relates to the mitigation and benefit enhancement measures identified in Sections 4.1, 4.2, 4.4 and 4.8 below, and Sections 5.9.6 and 5.9.12 of the ESIA. The Policy outlines Newmont's commitment to:



### Social Management Plan

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- the success of all employees;
- treating all people with respect;
- making employment decisions fairly;
- valuing diversity and promoting an inclusive work environment;
- investigating workplace complaints; and
- compensating in a fair manner.

The Newmont **Health and Safety Policy** (Newmont 2014b) requires the implementation of health and safety standards aimed at preventing harm, injuries, or fatalities, maintaining occupational health and hygiene standards, and promoting wellness and healthy living amongst its workforce. The Policy relates to Sections 4.7 and 4.8 below, and Sections 5.9.10 and 5.9.12 of the ESIA.

### 3.2 Local Employment and Procurement

Newmont has standards and initiatives in place to maximize available local content in its operations. The standards and initiatives relate to the mitigation and benefit enhancement measures discussed in Sections 4.1, 4.2, and 4.3 below and in Section 5.9.6 of the ESIA.

Newmont maintains a **Local Procurement and Employment Standard**. This Standard applies to their global operations and sets out the “*minimum requirements to ensure that programs are in place to identify and provide employment and business opportunities that can deliver sustainable mutual benefits to local stakeholders and Newmont*” (Newmont 2014c). The Standard requires the development of Local Procurement and Employment Plans for Newmont’s operations to optimize opportunities by promoting:

- local employability and skills development;
- diversity of the workforce;
- small business development for local people, indigenous, women and/or minority business owners; and
- Sustainable business opportunities.

The Standard does not outline strategies for local procurement, but rather provides the legal and risk-management framework for all goods and services procured for their mining operations. Newmont’s **Local Content Initiative** (Newmont 2016) includes an approach to identifying local vendors, and working with them to build capacity in terms of budgeting and bid preparation, operational improvements needed to meet the demands of a mine, and developing requisite health and safety plans. Newmont will adapt the initiative to the Sabajo Project. The ultimate goal of capacity building efforts is to have vendors reach a point where they are ready to diversify into other markets, and become less reliant on the mine for contracts.

### 3.3 Community Development

Newmont’s **Community Investment and Development Standard** (Newmont 2017b) defines the vision, objectives, and development priorities to ensure that community development opportunities are aligned with the company’s business objectives, and the United Nations Sustainable Development Goals. Community development activities are not mitigations to operational impacts of the mine. Rather, the primary aim is to facilitate economic development and social transformation amongst key stakeholder communities in a manner that will be sustainable beyond the life of the mine.

### 3.4 Indigenous Peoples and Land

Newmont's **Indigenous Peoples Standard** (Newmont 2015) and **Stakeholder Relationship Management Standard** requires engagement with Indigenous People to adhere to Free, Prior and Informed Consent (FPIC) requirements outlined by the International Council on Mining and Metals (ICMM) (Newmont 2014d). The Newmont **Land Acquisition and Involuntary Resettlement Standard** (Newmont 2014e) mandates that livelihood restoration activities maintain or improve income-earning capacity, production levels and standards of living. These Standards relate to the mitigation and benefit enhancement measures identified in Sections 4.4, 4.5, and 4.6 below, and to Sections 5.9.7, 5.9.8, and 5.9.9 of the ESIA.

### 3.5 Human Rights

The Newmont **Human Rights Standard** compliments and enhances the commitments put forward in a number of the plans discussed above by identifying the minimum requirements to identify, prevent, mitigate, track and report how the company is addressing Project-driven risks to human rights. The standard also outlines requirements for supporting and promoting human rights and the process of remediating adverse impacts caused by Newmont's operations. The Standard applies broadly, and relates to mitigation and benefit enhancement measures throughout the SMP and ESIA. Specific actions to avoid impacts to or demonstrate respect for human rights (HR) that are appropriate to that part of the management plan are listed with HR in the code.

## 4 MITIGATION AND BENEFIT ENHANCEMENT MEASURES

This section describes mitigation and benefit enhancement measures identified as part of the ESIA. Measures are assigned a code (e.g., ER01) for reference purposes later in the SMP. Where a mitigation or benefit enhancement doubles as a Human Rights management measure, an indication is made with **(HR)**.

### 4.1 Employment and Recruitment Plan (ER)

Benefit enhancement measures are designed to increase participation of affected stakeholders in economic opportunities offered by the Project. These measures would initiate after Project approval, with implementation beginning during construction and throughout operations. Many of these initiatives are already in place at Merian. Benefit Enhancement measures specific to employment and workforce management include:

- ER01: Undertake efforts to identify suitable Surinamese candidates for as many positions as possible during both the construction and operations. **(HR)**
- ER02: Stay in contact with the Kawina Traditional Authorities and continue ongoing engagement with them regarding Project opportunities. **(HR)**
- ER03: Create career development plans for employees that emphasize on-the-job training and skills development in pursuit of advancement.
- ER04: Post positions internally to encourage the advancement of the workforce into other categories of employment, thus creating entry-level job openings.
- ER05: Include in the employment responsibility of senior staff the requirement to mentor more junior employees in a manner that encourages skills development and career advancement.
- ER06: Establish achievable targets for growing the representation of key stakeholder groups in the Project workforce over time. **(HR)**
- ER07: Establish achievable targets for growing the representation of women in the Project workforce over time. **(HR)**

### Social Management Plan

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- ER08: Develop and implement a labor diversity strategy including measures to address structural discrimination particularly focused on increasing opportunities for Maroon and Amerindian people to fill semi-skilled & skilled labor positions. Recruitment process will maximize opportunities for employment of key stakeholder groups including accessible, timely job postings. **(HR)**
- ER09: Prior to construction, develop a strategy to enhance local employability for the construction phase and link it to requirements in contracting terms and conditions. **(HR)**
- ER10: Formalize mitigation measures in a Local Employment Plan as per the Local Procurement and Employment Standard including promoting local employability and skills development and setting objectives and Key Performance Indicators (KPIs) relative to diversity, equity, and gender in a rights-compatible manner and report as a human rights measure. **(HR)**

## 4.2 Contracting and Procurement (CP)

Benefit enhancement measures to increase participation in Project-related business opportunities focus on identifying and removing barriers within the contracting process. There will be some opportunities in the Project area with time. Benefit Enhancement measures specific to contracting and procurement include:

- CP01: Newmont's Local Content Initiative at Merian identifies local vendors and works with them to build capacity for budgeting and bid preparation, operational improvements to meet the demands of a mine, and developing health and safety plans. The Initiative would be adapted to the specific context of the Sabajo Project. Newmont will then work with identified local vendors to enact the subsequent goals of the initiative, with an end objective of building local vendor capacity through targeted procurement.
- Newmont will maintain a regularly updated Project database of potential local suppliers of goods and services that identifies:
  - Business interest, capacity and the nature of goods and services offered;
  - Contact information; and
  - Contract performance record.
- As part of the Local Content Initiative, Newmont will analyze barriers to the ability of key stakeholder groups to supply goods and services relative to Project procurement requirements, with a focus on Amerindian and Maroon communities. Objectives and KPIs will be developed to address structural discrimination, monitor and track success and identify areas for ongoing improvement and report as an HR measure. **(HR)**
- CP02: Give priority to suppliers from key stakeholder groups when sourcing raw materials, finished goods, and services that can be procured in the local market. **(HR)**
- CP03: Identify opportunities for 'ad hoc' or occasional income generation opportunities (filling sand bags, collecting seeds for reclamation, etc.). **(HR)**
- CP04: Establish achievable targets for local procurement (as a percent of total procurement) from key stakeholder groups that grow overtime. **(HR)**
- CP05: Provide businesses with timely information on procurement requirements.
- CP06: Implement procurement and contracting procedures that consider the potential need to break down bid packages and accommodate financial constraints of small enterprises.
- CP07: Provide explanations to interested businesses denied an opportunity to bid on procurement requests, and to businesses that compete on bids unsuccessfully, as to the reason for their denial or unsuccessful bid.

#### 4.3 On the Job Training (OT)

The focus of on the job training is to enable people to advance once employed. Advancement creates job openings for others in entry level or lower skilled areas of work. Enhancements specific to on the job training include:

- OT01: Provide training to semi-skilled and skilled employees in environmental management and health and safety.
- OT02: Create career development plans for employees that emphasize on-the-job training and skills development in pursuit of advancement.
- OT03: Include in the employment responsibility of senior staff the requirement to mentor more junior employees in a manner that encourages skills development and career advancement.
- OT04: Provide training to senior staff aimed at improving their ability to coach and mentor junior staff.
- OT05: Provide the opportunity for Project employees to suggest and attend "life skills" presentation on topics of interest. These may include topics such as starting up small businesses, saving and financial tips, effective communication and teamwork.
- OT06: Track training against objectives of diversity, adapt as required to meet objectives and report as a human rights outcome. **(HR)**

#### 4.4 Culture and Wellbeing (CW)

Mitigation measures associated with culture and wellbeing focus on establishing respectful relationships with the local population, and preventing impacts that could spur adverse effects on culture and wellbeing. Mitigations specific to culture and wellbeing include:

##### Intangible Culture

- CW01: Implement a complaint procedure that can identify if there are Project-related processes that are creating conflict within or between communities.
- CW02: Implement Newmont's employment policies, which aim to follow best practice and enable people to remain in their home communities in order to limit cultural change associated with Project activities.
- CW03: Consult with small-scale mining and logging operations about policies to secure the Project's boundary to prevent encroachment onto the potential mining concession.
- CW04: Consistently show respect to traditional authorities and their decisions in order to respect cultural rights and to prevent and manage conflict. **(HR)**
- CW05: Implement cultural sensitivity training programs to help out-of-area Project workforce understand the local cultural context.
- CW06: Establish workplace conditions that are sensitive to local cultures and values.
- CW07: The Social Responsibility Team should continue to engage with communities in the Project's Area of Influence in a culturally appropriate manner. This includes following their customs about newcomers to the villages, respecting taboos and communicating in their native languages, where possible.
- CW08: Regularly provide transparent and culturally appropriate information to the public about project activities, land acquisition, impacts and environmental management measures. **(HR)**
- CW09: Establish participatory processes to identify and manage Project-induced cultural changes that affected communities would like to address. **(HR)**



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#### Gender

- CW10: Provide employment opportunities for both men and women and track hiring of women;
- CW11: Adhere to cultural norms, respect taboos, and participate in relevant rituals as appropriate as Project disturbances to land, resources or areas of cultural values occur.
- CW12: Consider providing optional money management training for Project employees from Area of Influence communities, including support for opening up joint bank accounts for employees and their spouse, if requested.

#### Migration

- CW13: Widely circulate the Project's employment and procurement policy to limit the number of people who come to the region to search for direct and indirect employment opportunities.

## 4.5 Artisanal and Small Scale Mining (ASM)

### Background of ASM activities on the Sabajo Concession

Existing conditions identified through baseline studies identified approximately 200 people who are involved in ASM activities within the Sabajo Right of Exploitation. Newmont's approach to responsibly managing ASM stakeholders aligns with Newmont's Social Responsibility Standards and the International Finance Corporations (IFC) Performance Standards.

Newmont recognizes the Kawina Tribe as the traditional owner of the land on which Sabajo sits. However, baseline studies show that ASM activities only benefit select Kawina individuals (i.e., ASM miners, Land Bosses), rather than the larger Kawina community.

### Key Elements of the ASM Approach

In consideration of the existing conditions of ASM in the Sabajo area, and with recognition of the challenges of livelihood restoration for ASM miners, the Sabajo Project will utilize the following approach while progressing through project development in order to uphold the intent of Newmont's standards.

### Mitigations Specific to ASM

The Project will implement benefit enhancement strategies, as well as mitigations specific to ASM, as part of the social management plan. These include:

- ASM01: Consult with small-scale mining and logging operations about policies to secure the Project's boundary to prevent encroachment onto the potential mining concession and haul road.
- ASM02: Socialize and implement a human rights-compatible ASM Management Plan. **(HR)**
- ASM03: Engage with ASM in Sabajo Right of Exploitation to:
  - Communicate rules for co-existence (e.g. environmental management , health and safety and labor considerations);
  - Prior to construction of the Sabajo Project, provide sufficient advance notice to ASM operators such that they are able to avoid and minimize financial losses from equipment and other related investments; and
  - Provide assistance to transport equipment out of the area.
- ASM04: Provide options for livelihood enhancement that could include skills training to increase employability in the formal sector and capacity building to develop small businesses.
- ASM05: Continue to implement a 'no guns' policy on the concession. **(HR)**
- ASM06: Conduct a Voluntary Principles external audit, including input from local stakeholders.

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- ASM07: Continue work to sign Memoranda of Understanding with military and *Ordering Goudsector Suriname*
- OGS; take additional actions as necessary and document.
- ASM08: Implement stronger actions to address risks with public security and report on them publicly, both locally and externally. **(HR)**
- ASM09: Develop and carry out training program in human rights, the Voluntary Principles and the United Nations Guiding Principles with all Newmont management. **(HR)**
- ASM10: Work with private security contractors to screen private security guards for past human rights abuses. **(HR)**

#### 4.6 Land Use and Tenure (LU)

Land use mitigation is aimed at offsetting Project-induced economic displacement of land users. Mitigations specific to land use and tenure include:

- LU01: Where the Project will require clearing within the concession and along proposed roads to the Merian mine, make plans with commercial loggers and the Traditional Authorities in relevant communities that address impacts of lost forest resources. Such plans involve identifying merchantable trees and implementing timber salvage efforts.
- LU02: Engage with land users to agree on approved locations of crossings and do not allow construction of facilities, shops or settlements along the haul road.
- LU03: Consult with small-scale mining and logging operations about policies to secure the Project's boundary to prevent encroachment onto the potential mining concession.
- LU04: provide technical and legal support and resources to Kawina to assess impacts from Project and participate in negotiation process. **(HR)**
- LU05: provide full disclosure of impacts, especially water quality in appropriate language and detail to ensure comprehension and ensure Kawina are fully informed of potential impacts. **(HR)**
- LU06: develop rights-compatible plan for the haul road and document its implementation for prior consultation with and agreements on land take and impacts to forestry concessions. **(HR)**
- LU07: engage with Kawina to evaluate potential post closure options and involve them in closure planning. **(HR)**
- LU08: Evaluate options for participatory environmental monitoring programs with Kawina for potential impacts to their traditional lands. **(HR)**

#### 4.7 Traffic Management (TM)

Traffic mitigation focuses on reducing the potential for Project traffic to have an adverse impact on public safety. Mitigations specific to effects of traffic include:

- TM01: Adapt and implement the Merian traffic and transportation safety management plan to improve overall traffic safety and reduce risks within the transportation corridor. This will include:
  - Adopting limits for trip duration and arranging driver rosters to avoid fatigue;
  - Planned road use will be in daylight hours, given that the risks of some types of incidents would be higher for vehicles travelling at night;
  - Contractors and subcontractors will be required to adhere to Newmont driving standards; and
  - Use of a reporting system for local communities to report issues relating to road use, safety, or other traffic concerns so that Newmont can take action to improve measures for safety where needed.

### Social Management Plan

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- Identify locations and timing of high priority community events (i.e., school bus and school children mobilization periods), include in transport safety plan and strictly enforce additional safety measures.
- TM02: The traffic and transportation safety management plan will include increased maintenance of project access routes beyond the current maintenance program that is implemented by Government, and monitoring for increases in Project traffic to determine if additional mitigation measures are required.
- TM03: Depending on which access route to the Project is selected, further engagement will occur with roadside communities to determine most appropriate mitigations.
- TM04: Monitor speed of vehicles with spot checks and/or GPS monitoring devices at certain locations along Newmont maintained portions of the access road.

### 4.8 Community Health (CH)

Proposed community health mitigations would offset the Project's potential to increase infections and chronic disease, and affect public health and safety. In some regards, community health mitigation results in net benefits. Mitigations specific to community health include:

- CH01: Ensure Project designs reduce the potential for sources of vector breeding (i.e. minimize standing water). In addition, the positioning of potential mine accommodation should be assessed in terms of its proximity to breeding sites.
- CH02: Implement the Newmont Global Health Management Guideline for Pandemic Events and a Health Incident Response Plan.
- CH03: Ensure Newmont-utilized medical facilities can test for and treat malaria, leishmaniosis and other vector-borne diseases.
- CH04: Provide health information on vector-borne disease to workers through posters and awareness sessions.
- CH05: Implement a Sexually Transmitted Infection (STI) and Human Immunodeficiency Virus (HIV) policy for Newmont. This will include issues stemming from accommodation camps and extended time away from families, voluntary testing, counseling and access to treatment.
- CH06: Include health education on STIs and HIV during inductions.
- CH07: Improve access to confidential STI diagnosis and treatment for the workforce.
- CH08: Supply free condoms for employees and contractors.
- CH09: Adapt and apply a traffic and transportation safety management plan (adopted from the plan in place at Merian) to improve overall traffic safety and reduce risks within the transportation corridor. The plan will include contractors and subcontractors.
- CH10: Support an educational program in schools along Project access routes regarding road safety among children and teenagers, as well as for the school bus drivers.
- CH11: Initiate screening programs for the early recognition of chronic diseases and appropriate treatment practices.
- CH12: Ensure that living areas are equipped with facilities for physical activities.
- CH13: Implement a system that controls the consumption of alcohol on-site.
- CH14: Utilize a rating system on canteen food choices and encourage healthy eating.
- CH15: Provide employees training on the responsible use of alcohol, and facilitate access to programs for addictions and mental health issues.

## 5 HUMAN RIGHTS MANAGEMENT PLAN

The Human Rights Impact assessments integrated into the ESIA identify which project impacts have the risk of affecting human rights. The actions that a company is expected to take to demonstrate respect for human rights depend on the level of involvement of the company in that impact; the Project can cause, contribute to, or be directly linked to an impact on human rights. The main objectives of human rights integration are to:

- target actions to avoid negative impacts to human rights;
- where avoidance is not possible, reduce the risks of, or mitigate the negative effects of the Project on the enjoyment of human rights;
- enhance opportunities to improve fulfilment of human rights;
- comply with Newmont policies to protect human rights;
- strengthen rights-compatible processes, participation of rights-holders and their inclusion in decision-making processes that affect them; and
- provide indicators for tracking and reporting on human rights performance at Sabajo.

### 5.1 Integrated Human Rights Management Measures

The management measures integrated in the SMP (above) are for those potential impacts which are caused by or contributed to by the Project. In order to demonstrate Newmont's duty to respect human rights, the Project is required to take actions to avoid, reduce or mitigate the risk of negative impacts. If negative impacts to the fulfilment of human rights occur, the Project must have a robust process in place to review and provide remedy for those impacts it has caused, and take actions to prevent it from happening again.

Many of the measures proposed to enhance the socio economic and environmental performance of the Project are also human rights management measures. Where this overlap occurs, the proposed management measures are indicated with the (HR) at the end.

Monitoring programs are required to track and evaluate the effectiveness of measures identified. KPIs will track human rights compliance and should be compiled and reported separately to reflect the additional actions required to respect human rights.

### 5.2 Management Actions for Human Rights Risks not addressed in this ESIA

- HR01: Carry out a human rights risk assessment in the supply chain with particular focus on labor rights performance of contractors and subcontractors beyond legal requirements in Suriname; integrate the results into the human rights management and tracking process.
- HR02: At the level of Newmont, review workforce and employment practices to ensure compliance with international human rights standards and integrate the results into the human rights management and tracking process. Specifically consider a diversity strategy aimed at addressing structural discrimination.
- HR03: Strengthen the grievance mechanism procedures' redress process and ensure it is consistent with the United Nations Guiding Principles s.
- HR04: Develop a Human Rights Performance monitoring and reporting program aimed at meeting human rights due diligence standards.



## **6 RELATIONSHIP BETWEEN STANDARDS AND MITIGATION**

Table 6-1 displays the Project effect before and after application of mitigations and benefit enhancement measures. The mitigations and enhancements are assumed to be effective and will require monitoring (see Section 9.0). The table also shows the relationship between the mitigation and benefit enhancement measure and Newmont's policy or Standard.

SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

Social Management Plan

Table 6-1 Summary of Project Effects, Mitigation, and Alignment with Newmont’s Standards

Topic	Project Effect	Pre-Mitigation Consequence	Post-Mitigation Consequence	Mitigations and Benefit Enhancements	Newmont Corporate Policies and Standards
Local Economics/ Infrastructure	The Project will generate direct employment opportunities and associated incomes	Low Positive	Low Positive	ER01 to ER08	Sustainability and External Relations Standard; Local Procurement and Employment Standard; Local Content Initiative; People Policy
	The Project will generate business opportunities through the procurement of goods and services	Moderate Positive	Moderate Positive	CP01 to CP07	
	The Project will increase use of transportation infrastructure	Low Negative	Low Positive	TM01 and TM02	Not Applicable
Culture and Wellbeing	The Project could result in changes in culture associated with in- or out-migration	Low Negative	Low Negative	CW 02 and CW13	Code of Conduct
	The Project could influence the social and cultural identity of the Kawina	High Positive	High Positive	Recognition of traditional land	Community Investment and Development Strategy
	The Project could influence social conflict	Low Negative	Low Negative	CW01; CW03 to CW09	Code of Conduct; People Policy
	The Project could influence gender relations	Low Positive	Low Positive	CW10 to CW12	Code of Conduct; People Policy
ASM	The Project will displace some small scale mining operations	High Negative	Moderate Negative	ASM01 to ASM10	Land Acquisition and Involuntary Resettlement Standard
Land Use and Tenure	The Project could affirm the customary land tenure of the Kawina	High Positive	High Positive	Recognition of traditional land	Code of Conduct; Indigenous Peoples Standard
	The Project could impact recreation and tourism activities in the vicinity of local communities	Negligible Negative	Negligible Negative	No mitigation required for negligible impacts	Code of Conduct
	The Project could impact community and commercial forestry activities through direct land take and increased access	Low Negative	Negligible Negative	LU01 to LU03	Land Acquisition and Involuntary Resettlement Standard
	The Project could impact hunting and fishing activities of displaced small-scale miners	Negligible Negative	Negligible Negative	No mitigation required for negligible impacts	Land Acquisition and Involuntary Resettlement Standard
Quality of Life	Project traffic will impact the quality of life of those residing in Brokopondo communities	Low to Moderate Negative	Low Negative	TM01 and TM02	Health and Safety Policy
	Project traffic will impact the quality of life of those residing in the off-road Carolina Road communities	Moderate to High Negative	Low to Moderate Negative	TM01 and TM04	
	Project traffic will impact the quality of life of those residing in Powakka	High Negative	Moderate Negative	TM01 and TM04	
Community Health	Health Issue #1: Vector-Related Diseases: Employees, their families and neighbors	Moderate Negative	Positive (unclassified)	CH01 to CH04	Code of Conduct; Healthy and Safety Policy
	Health Issue #4: Sexually Transmitted Infections: General population – all communities but especially the youth	High Negative	Low Negative	CH05 to CH08	Code of Conduct; Health and Safety Policy
	Health Issue #7: Accidents and Injuries: Children in school age and drivers of 2/3 wheel vehicles	High Negative	Moderate Negative	CH90 and CH10	Code of Conduct; Health and Safety Policy
	Health Issue #12: Non-Communicable Diseases (NCDs): Workers	Moderate Negative	Positive (unclassified)	CH11 to CH15	Health and Safety Policy

Newmont’s approach to human rights extends across all topics requiring socio-economic management. **Human Rights Standard**

Mitigation and benefit enhancement coding legend: ASM = artisanal and small scale mining; CH = Community Health; CP = Contracting and Procurement; CW = Culture and Wellbeing; ER = Employment and Recruitment; LU = Land Use; OT = Ongoing Training; TM = Traffic Management.

## **7 SOCIAL ASPECTS OF MINE CLOSURE**

### **7.1 Standards and Guidance**

The Project will develop and implement a closure plan. Newmont's guidance for Social Impact Assessment (NEM-SR-S.02) requires social impact assessment updates be conducted during all phases of the Project, including during planning stages, every five years during operations, and three years prior to decommissioning (with a closure focus). Newmont believes that social planning is an important component of the closure process.

### **7.2 Social Components of Closure**

Newmont has developed a Closure and Reclamation Plan (CRP) for Merian that will also apply to the Sabajo Project. As part of the CRP, Newmont commits to establishing the manner in which it will manage potential social impacts during closure and post-closure including the following:

- Details of how Newmont will carry out an analysis of alternatives to retrenchment of employees;
- Providing all workers with suitable notice of dismissal and severance payments mandated by law and collective agreements in a timely manner including social benefits and pension payments where relevant;
- Provision to engage and coordinate with the Government of Suriname (GoS) where possible regarding potential new opportunities and employment requirements at other projects during the Sabajo closure / post-closure process;
- Establishing participatory processes and engagement with stakeholders during closure planning;
- Establishing review and update processes for the closure plans;
- Establishing objectives, targets and monitoring requirements to determine the efficacy of social closure initiatives;
- Establishing draft closure costs for administration and execution of these processes and plans; and
- Engaging with stakeholders to establish potential community uses of infrastructure after decommissioning and relinquishment of the site.

Contextual information will be gathered to feed into closure planning. A detailed list of topics is provided in the Sabajo Project CRP (xxx Vol. B). The information is similar to socio-economic baseline information and is intended to provide profile information on communities that will be affected by Project closure.

As described in the CRP, principles and goals of closure will be identified. Setting target closure outcomes will involve key stakeholder groups, communities and the government. There may be a considerable engagement process required to set a closure vision that aligns with the views of the future of Newmont, key stakeholders, and communities. Additional guidance on closure planning is provided in the CRP, citing IFC and ICMM recommendations.

## 8 ROLE OF ENGAGEMENT

Engagement is integral to socio-economic management implementation, monitoring and adjustment. Newmont's engagement plan provides people with the mechanisms they need to provide input, such that the Project is better able to inform its decisions that have potential to affect people. There are also expectations on the part of affected communities for participation in processes to monitor Project effects and to monitor Newmont's compliance with conditions under which the Project may be approved.

Information disclosure provides the information people need to engage and participate in the Project from an informed position. There is clear interest on the part of affected people for more information on the Project, its potential effects, and proposed socio-economic management measures.

The implementation of a consultation program, inclusive of villages in the Project Area of Influence and other stakeholder groups, throughout the construction, operation and closure phases of the Project will include the following:

- Hold krutus at the village level with affected people and their TAs at least twice annually at established dates, and at additional times as may be requested;
- Meet with subgroups, for example with women, youth and ASM operators where issues or opportunities arise that may not be of general interest;
- Distribute information through appropriate media on Project progress and events of interest, including employment and business opportunities;
- Include public consultation and participation in monitoring programs;
- Provide training to all management and supervisory staff on communication with project area populations;
- Utilize the Cintellate database to record events, issues raised and undertakings to resolve issues.
- Implement a Complaints procedure to manage instances over the life of the Project where people feel they have grounds for complaint as a result of Newmont exploration, project or operational activities or the behaviors of Newmont employee(s) and/or contractors. The procedure currently entails:
  - A simple process to lodge a complaint, either verbally or in writing, taking care to ensure the process is accessible (by phone, email, community drop boxes, Welcome Center) ;
  - A time frame for which a response to the complaint is provided;
  - Clear roles relative to addressing the complaint. Newmont has established a Complaint Committee that is comprised of managers and supervisors responsible for review and resolution of medium to high risk complaints; assistance to the complainant in completing the 'Form' and attaching supporting information is provided. The complainant reviews all material prior to its submission.
  - A requirement that workers and contractors maintain working knowledge of the procedure and are able to direct external parties to the proper individuals and procedures for lodging complaints.
  - A system (Cintellate) to record all grievances, disputes and their resolution;
  - Means for assuring feedback or action relevant to Newmont where systematic complaints are observed.

In addition to ongoing consultation and engagement, Newmont has an ongoing commitment to Indigenous People's rights (Indigenous People's Standard) and upholding the principle of FPIC. As Sabajo is an extension of the Merian mine, the ESIA process for Sabajo sought to incorporate



### Social Management Plan

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Indigenous Peoples and their rights into the planning processes of the Project and demonstrate that FPIC was part of Project development. While Newmont did not seek consent of traditional leaders who claim rights to the Sabajo area at the start of exploration activities, they have subsequently engaged with them to gain their consent for project development.

Consultation with the Granman of the Ndyuka Maroon Tribe and a Council of Elders has been undertaken to initiate the FPIC process. During the consultation, the Granman gave his explicit approval for Newmont's ongoing exploration activities in the region. Consultation activities also included every Maroon and Amerindian tribe near the Project as part of the ESIA and FPIC process that determined whether the Project sat on traditional tribal lands. A formal agreement making process based on FPIC principles commenced in early 2018 with the Kawina tribe.

Considering that FPIC is both a process and an outcome, Newmont is undertaking a process toward reaching an agreement that can illustrate that consent has been given freely without coercion and there are no barriers to their participation. Prior consent will be demonstrated as much as possible through documented approval from all potentially impacted tribes and communities through the successive stages of the Projects development. Newmont will have ongoing and grassroots consultation to ensure that rights holders have sufficient opportunity to be informed about the Project and all aspects of its development. In addition, evidence will be documented that rights holders have received support of independent experts as determined and selected by themselves.

Newmont also aims to demonstrate consent for the Sabajo Project through culturally appropriate methods. Prior to signing an agreement, the draft agreement will be shared with the community through public meetings for community members to provide final feedback to their leaders. Newmont will commission research to validate its current understanding that signatures of the Head Captains will constitute formal consent of Tribal leadership and on behalf of the wider community, after validation by the Granman.

## 9 MONITORING

Newmont has prepared Environmental and Social Monitoring and Management Plans (ESMMP; vol. B) as a framework to guide project- specific management and mitigation planning and monitoring. The ESMMP described socio-economic monitoring in detail. This section presents an overview of monitoring requirements. There are three components to socio-economic monitoring:

- Compliance monitoring, to monitor the Sabajo Project's results in relation to socio-economic benefits and public health and safety and also in compliance with other socio-economic undertakings;
- Monitoring for the effectiveness of socio-economic measures in mitigating negative impacts and enhancing benefits; and
- Monitoring for adaptive management such that the Project is able to respond to any evolving impacts on affected communities and stakeholder groups.

#### Compliance Monitoring

Compliance monitoring relies on Newmont's own records on its operations and will provide monitoring data on many of the undertakings described. Such records include, for example, those on employment training and procurement activities, and consultation records. In this regard, Newmont will:

- Maintain full human resource records in a form that will permit annual roll up of selection, employment, promotion, training and exit statistics on the workforce by residence, gender, target stakeholder group, level and occupation as a percentage of the total workforce;
- Maintain procurement records in a form that will permit annual roll up of the number value and general content of contracts for goods and services by supplier location and ownership, as a percentage of total procurement.
- Require of contractors annual reporting on Newmont -specific employment and procurement that provides the same information.
- Maintain health and safety, accident, breach of worker codes of conduct and any other relevant records pertaining to events that occur in direct relation to Newmont Suriname operations;
- Flag any anomalous results of traffic, air quality and noise monitoring programs in order to permit and assessment of effects on communities;
- Maintain records of all public education events (such as environmental awareness or traffic safety education) including the content of programs and participation numbers.
- Maintain records on support to community development, identifying the objectives of activities, organizations, or individuals in receipt of support, and outcomes;
- Maintain records of all formal consultations, meetings and grievance and dispute events with affected people. Note issues raised, attendance at meetings and resolutions;
- Maintain copies of all information disclosure materials distributed by the Project, and;
- At least on an annual basis, undertake a formal analysis of the results of the above to determine the degree of compliance with the ESIA related commitments and to identify any specific obstacles or problem areas and systematic successes or failures.

#### Monitoring for the effectiveness of socio-economic measures in mitigating negative impacts and enhancing benefits

In addition to the above, Newmont will engage with communities and other stakeholders in a process to examine the effectiveness of mitigation and benefit enhancement measures. This monitoring will make use of results of compliance monitoring as described above, and will be supplemented, for example, with perception survey results and qualitative information from key interviews.

This monitoring will analyze such information to establish the effectiveness of mitigation and benefit enhancements and whether or not they need to be adjusted to achieve their desired outcomes.

#### Monitoring for Adaptive Management

The impact assessment has come to some conclusions about potential impacts, which may need to be included in socio-economic monitoring. These may be somewhat unpredictable in their scope and their observed occurrence may not be attributable to the Project, but to other forces of social and economic change. For example, out-migration, erosion of traditional culture, increase in family breakdown are often the result of any combination of forces from the continuation of existing trends to movement of women into paid employment or to unfortunate personal choices of new disposable income.

Nevertheless, it is in the interest of Newmont to understand social trends such that where the Project is able to intervene effectively, it has the information to do so. Understanding cause and effects is

### Social Management Plan

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important to maintaining a constructive relationship between affected people and the Project and to adjusting mitigation measures in response to evolving impacts.

Select socio-economic parameters will be monitored. As noted in the ESMMP, (vol B) and as required by Newmont, baseline data will be updated for:

- Population growth, age and gender distribution;
- Cost of living;
- Primary, secondary and vocational school attendance;
- School completion;
- Numbers and types of new businesses;
- Types and incidence of disease;
- Traffic accidents;
- Status of ASM equipment owners; and
- Number of artisanal and small scale miners involved in Newmont -supported efforts for safer and more environmentally friendly mining techniques.

It is expected that indicators may be refined over time as adjustments are made to mitigations and benefit enhancement measures. Newmont will communicate monitoring results to internal staff as appropriate such that the information can be used to adjust policies and procedures where changes are necessary.

### Monitoring for Human Rights Performance

Newmont will monitor, evaluate and take action on human rights indicators that will measure the effectiveness of the actions identified in this SMP. Consistent with due diligence requirements, the company will report on the results of monitoring and on actions taken to respect rights, using the framework provided by the measures identified as having a human rights dimension.

## 10 IMPLEMENTATION

### Organization

Newmont's Social Responsibility (SR) department would support community initiatives (i.e. ad hoc procurement opportunities) including implementation of consultation activities that are intended to ensure that social management is achieving its objectives, that records are kept, and that grievances are promptly dealt with. SR is also expected to provide input into design of public and worker education programs and cultural sensitivity training. SR is also responsible to provide ongoing information to other Project operational departments including Environment, Health, Human Resources and Procurement, on perceptions and feedback from people in response to the Project.

### Funding

Costs associated with SMP implementation involve personnel salaries, database maintenance, and costs associated with engagement (travel, materials). Costs for third party monitoring may be required (social auditing).

### Reporting

Compliance monitoring will be managed and administered solely by Newmont - it consists only of the collection, analysis and reporting of relevant internal management information.

Effectiveness monitoring and monitoring for adaptive management will be participatory, involving not only Newmont but also affected communities and their leaders. Newmont will contract for the services of a third party monitor to establish the detail of a full monitoring program. Such detail will include definition of additional baseline studies (required every five years and three years before closure), participatory processes to be used, data requirements and sources, data collection and analysis methodologies, roles and responsibilities and schedules. This planning will be completed before the construction phase, such that the monitoring program can be put in place before Project initiation.

Results will be annually reported in an appropriate format and discussed with stakeholders and communities with a view to maintain transparency and accountability and building confidence in economic and social performance of the Project relative to commitments.

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March 2018

# SABAJO PROJECT

## ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### TRAFFIC MANAGEMENT PLAN

Report No. 1669326





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## **Abbreviations and Units of Measure**

<b>Abbreviation</b>	<b>Definition</b>
ESIA	Environmental and Social Impact Assessment
HFO	heavy fuel oil
IFC	International Finance Corporation
km	kilometer
LFO	light fuel oil
Merian mine	Merian Gold Mine
Newmont	Newmont Suriname, LLC
S&ER	Sustainability and External Relations
the Project	the Sabajo Project

### 1 INTRODUCTION

Newmont Suriname, LLC (Newmont) has prepared a management plan for heavy vehicle transport, which considers the available transport options from Paramaribo to the Sabajo and/or Merian Site. While focused on large truck traffic, the management practices listed are also generally applicable to light vehicle traffic to site as well.

There are three options available for the transportation of materials from Paramaribo to the Sabajo and Merian site:

1. The current transportation route for materials to Merian and potentially to Sabajo uses the state highway system from Paramaribo to Moengo (approximately 100 kilometers [km] of paved highway) and then utilizing the laterite road known as the Langatabiki Road (state owned and maintained) from Moengo to the Merian site (approximately 80 km). This option includes barging or direct shipment via ocean carrier of cargo to a port facility located in Moengo and then transporting the barged goods to Merian using heavy vehicles.
2. An alternative being analyzed as part of the Sabajo Environmental and Social Impact Assessment (ESIA) is the use of the Afobaka Road from Paramaribo to Sabajo and Merian. This route is paved approximately 103 km of the 141 km length. The remaining 37 km would be upgraded and maintained by Newmont during operations. This option also includes using the Nieuw Amsterdam Port in Paramaribo or the Paranam Port for materials using heavy vehicles.
3. The second alternative being analyzed in the ESIA is the use of the Carolina Road which starts in Paramaribo and crosses the Carolina Bridge at which point the route is an unpaved road for the next 62 km. This option also includes using the Nieuw Amsterdam Port in Paramaribo or the Paranam Port for materials using heavy vehicles.

It is expected that all options may be utilized by the Sabajo Project (the Project). Figure 1 shows the three transportation route options.

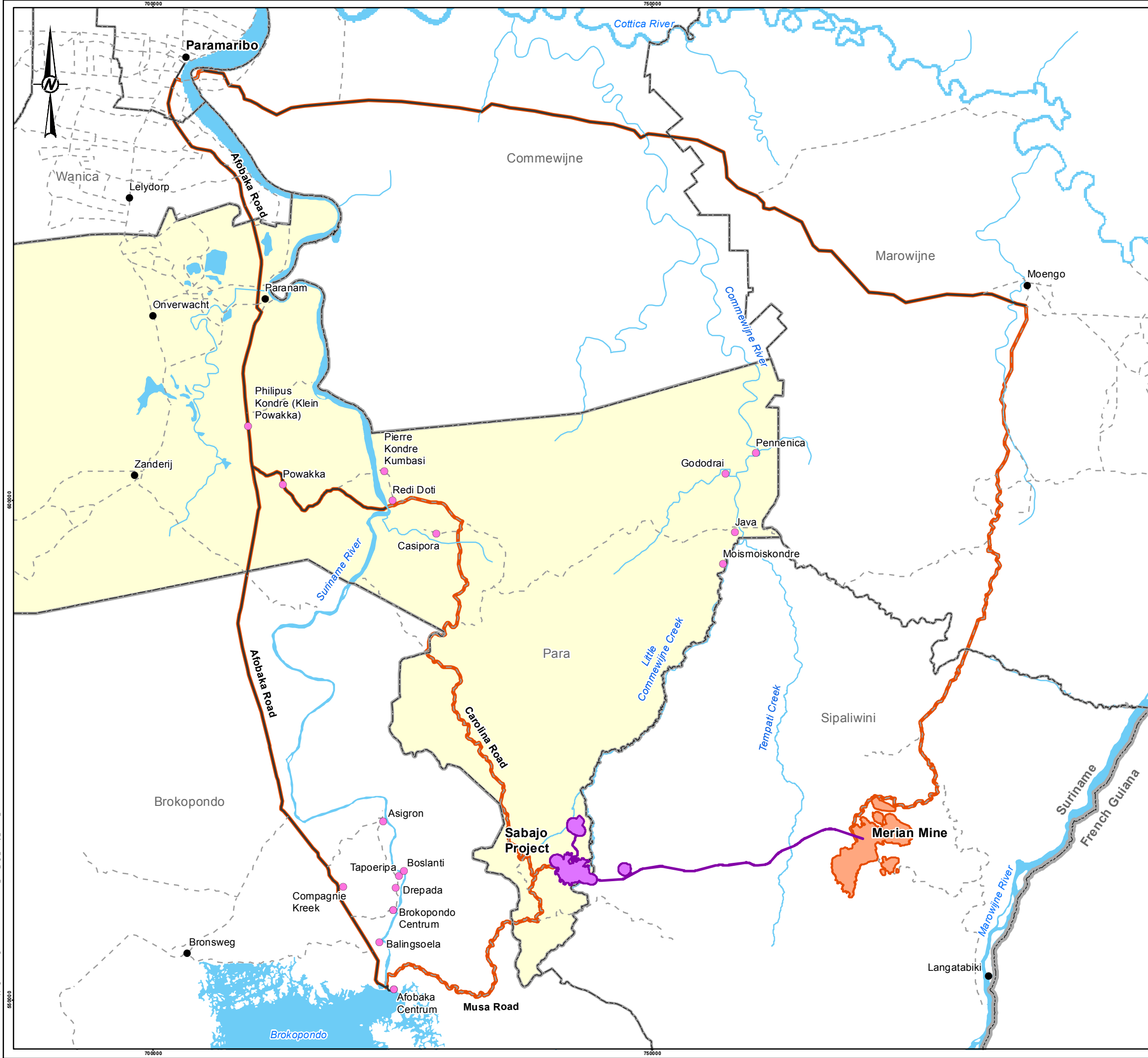
Newmont engages qualified local Suriname-based contractors to provide material transport requirements during both the construction and operations phases of the Project.

#### 1.1 Purpose

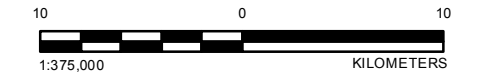
The purpose of this plan is to describe the requirements for managing heavy vehicle transport of materials to and from Newmont's Merian Gold Mine (Merian mine) and/or Sabajo sites, with a particular focus on the transport of dimensional cargo and dangerous goods.

#### 1.2 Scope

This plan applies to transport of materials from arrival or consolidation in Paramaribo to the Project site and to any materials returned from the Merian mine and/or Sabajo site to Paramaribo.



- LEGEND**
- STUDY AREA COMMUNITY
  - OTHER COMMUNITY
  - DISTRICT BOUNDARY
  - INTERNATIONAL BOUNDARY
  - PAVED ROAD
  - - - UNPAVED ROAD
  - WATERCOURSE
  - WATERBODY
  - POTENTIAL PROJECT ACCESS ROUTES
  - SABAJO PROJECT PHYSICAL IMPACT AREA
  - MERIAN MINE EXISTING AND APPROVED FOOTPRINT



**REFERENCE(S)**  
 BASE DATA AND TOPOGRAPHY PROVIDED BY NEWMONT.  
 DATUM: WGS84 PROJECTION: UTM ZONE 21

**CLIENT**  
 NEWMONT SURINAME

**PROJECT**  
 SABAJO PROJECT ESIA

**TITLE**  
 SABAJO ACCESS ROUTES

CONSULTANT	YYYY-MM-DD	2018-03-01
DESIGNED	JP	
PREPARED	PT	
REVIEWED	GJ	
APPROVED	GJ	



PROJECT NO. 1669326 CONTROL REV. 0 FIGURE 1

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### 1.3 Objectives

The objectives of this plan are to:

- capture and memorialize restrictions on transport activities; and
- minimize impacts along the transportation corridor from Paramaribo to the Sabajo and/or Merian mine site.

### 1.4 Background

Newmont consumes large quantities of fuel and reagents as part of its mining and extraction process during operations of both Merian and Sabajo. In addition, there will be extra heavy vehicle traffic importing equipment and materials for the construction of the Project.

It is expected that during the construction phase of the Project, material transport movements will peak at approximately 20 truckloads per week as the Merian mine will continue using the Moengo Route. Materials transported during the construction phase will consist primarily of construction materials, equipment and fuel.

It is estimated that during the operations phase of the Project, material transport movements will peak at approximately 100 truckloads per week with fuel (heavy fuel oil [HFO]/ light fuel oil [LFO]) contributing 50 percent of the projected load volume. Other (non-fuel) materials transported during the operations phase will consist primarily of reagents.

#### 1.4.1 Potential Risks

Potential risks associated with heavy vehicle traffic movements to and from the Merian Site are summarized below:

- potential for truck traffic congestion;
- potential for poor truck driver behavior;
- potential for erratic driving by other road users;
- potential for accidents and spillage;
- potential to impact resident amenity;
- fugitive dust emissions during transport;
- potential for land contamination along transport routes; and
- deviation from designated freight routes.

#### 1.4.2 Baseline Information

The Merian mine and Sabajo sites will require heavy vehicle transport to supply construction materials, equipment and fuel during the construction phase of the Project and to supply reagents, fuel and consumables during the operations phase of both sites.

Currently there is one route option available to the Project with two other options being explored.

As part of the development of the ESIA, existing vehicular and pedestrian traffic along the Afobaka and Carolina Transportation Routes were counted at 11 locations in June through September 2017 to measure both weekday and weekend traffic patterns (Map 4.13-1 of the ESIA).

Some of the key learnings from the data collection with respect to traffic counts included:

### Traffic Management Plan

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- The location with most pedestrians observed was at Multicultureel Centrum Powakka, where a considerable number of children are included in the pedestrian numbers.
- Peak traffic typically occurred between 16:00 (4 pm) and 18:00 (6 pm) in most locations; peak pedestrian times were more varied and occurred in the morning or around 15:30 after school let out.
- On both the Afobaka and Carolina Roads, traffic gradually decreases moving north to south; very little traffic exists toward the southern end of these roads.
- At most locations and most dates, the most common type of vehicle was the car, with light trucks the second.
- Weekend traffic is substantially higher than weekday traffic at the majority of the sampling sites.

Sensitive Receptors along the Carolina and Afobaka Roads have been mapped in Figure 2.

## 2 LEGAL AND OTHER REQUIREMENTS

### 2.1 Legal

Suriname laws and regulations that are applicable to this plan include the following:

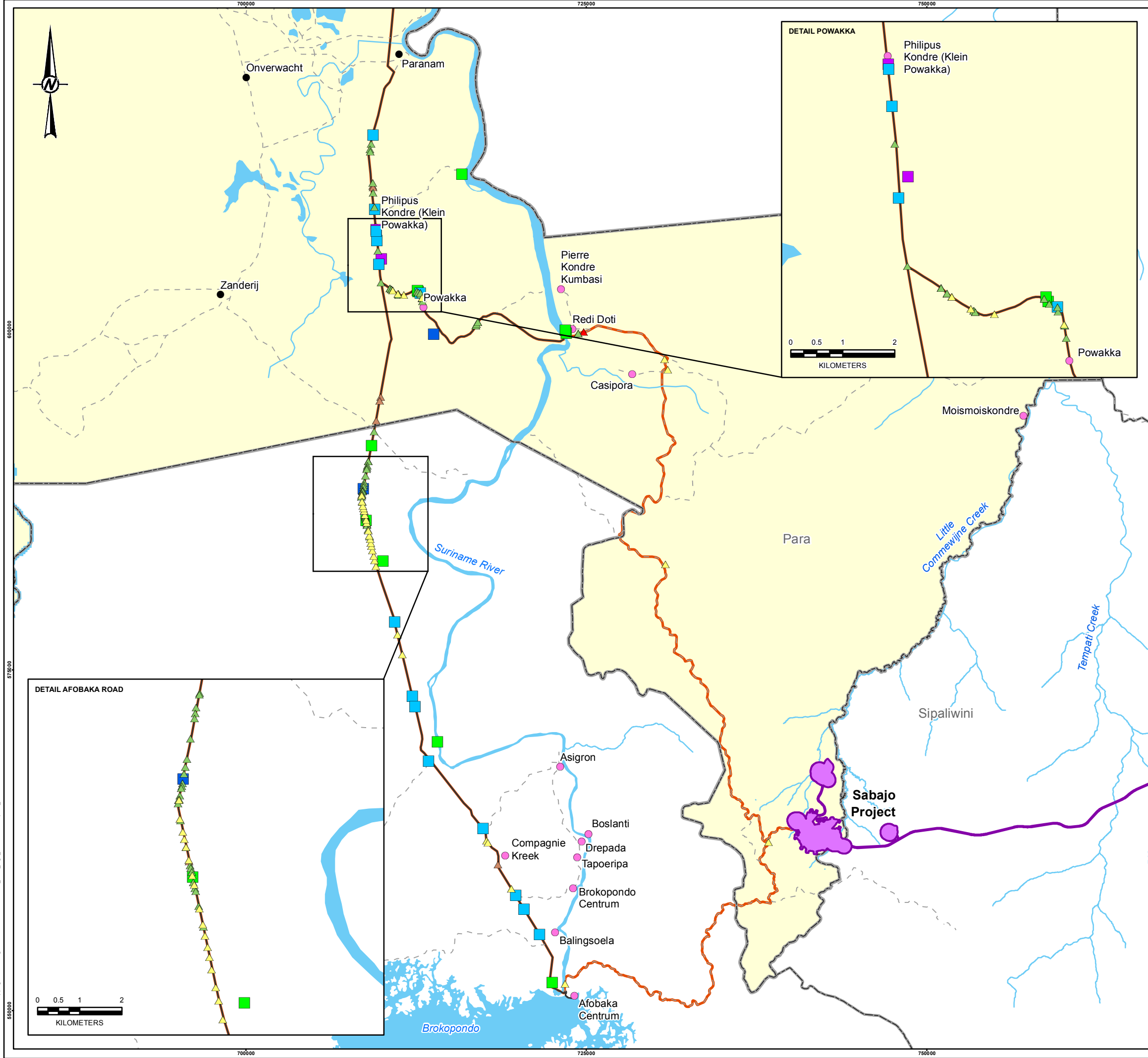
- Occupational Safety Law G.B. 1947 no.142 as amended (Ministry of Labor)
- Advance safety and hygiene in enterprises so as to reduce the chance of accidents and occupational diseases.

### 2.2 Other

Newmont has adopted the Sustainability and External Relations (S&ER) Standards and Policies of Newmont Mining Corporation, as well as international best practices for the purpose of developing mitigation and management measures. These commitments include aspects as described below:

- Newmont Security and Human Rights S&ER Standard;
- International Standards:
  - Section 3.4 of the International Finance Corporation (IFC) Environmental, Health, and Safety General Guidelines, which address traffic safety, emphasizing the “adoption of safety measures that are protective of project workers and road users, including those who are most vulnerable to road traffic accidents” (IFC 2007); and
  - Section 3.5 of the IFC Guidelines, which describe requirements related to identification of hazardous materials and the requirement to have mobile response resources in case of spills (IFC 2007);
- International Cyanide Management Code, Principles and Standards of Practice; and
- Other Newmont Environmental and Social Management and Monitoring Plans, including:
  - Worker Health & Safety and Wellness programs, particularly as it relates to Contractor’s Health and Safety Management, Driver Policy; and Worker Fatigue and Stress Management Program.





**LEGEND**

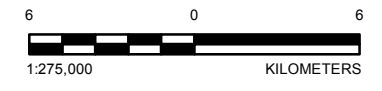
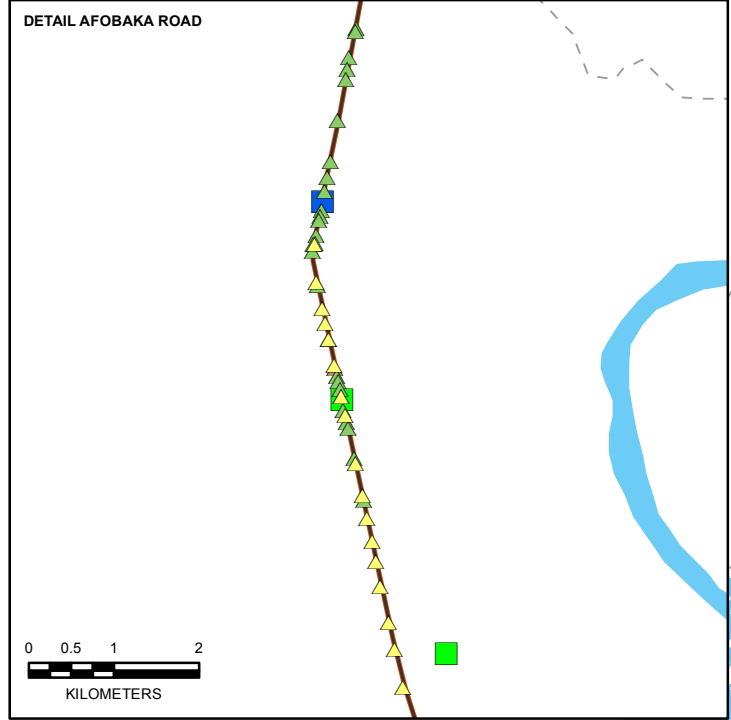
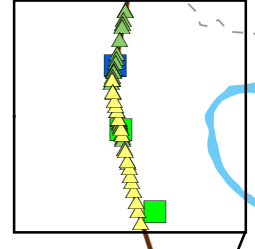
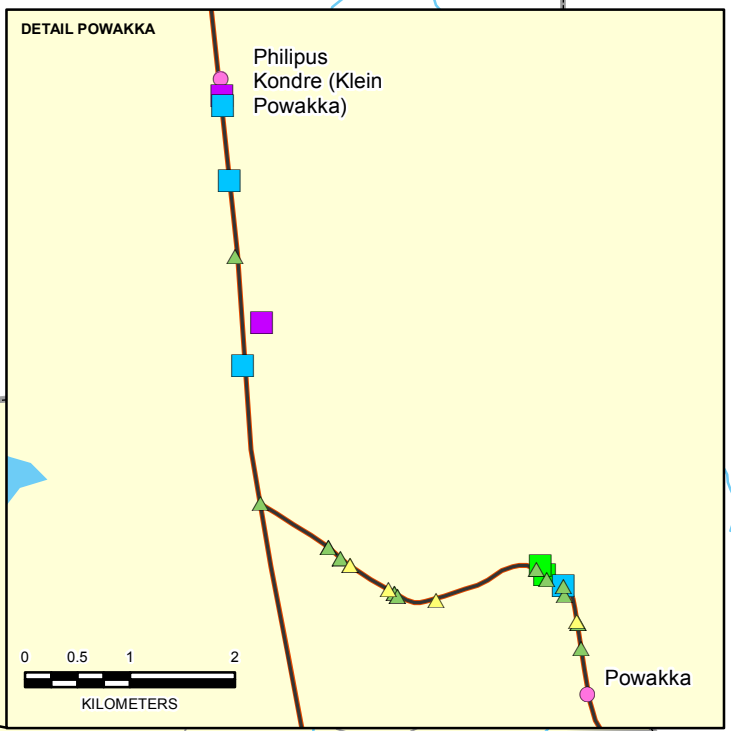
- COMMUNITY
- STUDY AREA COMMUNITY
- DISTRICT BOUNDARY
- PAVED ROAD
- - UNPAVED ROAD
- WATERCOURSE
- WATERBODY
- POTENTIAL PROJECT ACCESS ROUTES
- SABAJO PROJECT PHYSICAL IMPACT AREA
- PARA DISTRICT

**SENSITIVE OBSERVED USES**

- BUS STOP
- CHURCH
- RECREATIONAL SITE
- SCHOOL

**OBSERVED USES**

- ▲ CHECKPOINT SBB REDI DOTI
- ▲ LOGGING COMPANY
- ▲ SALES STAND
- ▲ MUSTER POINT



**REFERENCE(S)**  
 BASE DATA AND TOPOGRAPHY PROVIDED BY NEWMONT. ROAD CONDITION AND ROAD FEATURES DATA PROVIDED BY ILACO.  
 DATUM: WGS84 PROJECTION: UTM ZONE 21

CLIENT  
 NEWMONT SURINAME

PROJECT  
 SABAJO PROJECT ESIA

TITLE  
**SENSITIVE RECEPTORS FOR TRAFFIC EFFECTS**

CONSULTANT	YYYY-MM-DD	2018-03-01
	DESIGNED	GJ
	PREPARED	AL
	REVIEWED	GJ
	APPROVED	GJ

P:\1669326\Maping\MOXManagement\Plans\FINAL\1669326\_INV\_Fig2\_SensitiveReceptors\_Rev0.mxd PRINTED ON: 2018-03-01 AT: 3:28:58 PM  
 25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3/B

### 3 MANAGEMENT STRATEGY

The Project will provide contractors the MGP Mobile equipment standard (MP-HSLP-SOP-038) prior to engaging any contractor for service. Prior to commencing service, the Project at its discretion will inspect each vehicle to ensure compliance with the Project equipment standard.

The Project where possible will ensure that transport units travel in pairs to ensure all vehicles have support during the transport operation.

All transport vehicles will be equipped with VHF radio and cell phones, call points will be identified for driver updates with traffic control (Logistics Group). VHF radio and/or cell phone communications has been established by the Project for the entire transport corridor.

Table 1 summarizes the vulnerable locations observed along the Carolina and Afobaka Roads in 2017 (Figure 2).

**Table 1 Vulnerable Locations on Afobaka and Carolina Routes**

Road Segment	Description	Number	Typical Distance from Road (m)
Afobaka Road North Segment (this is the N-S road from Paranam to Afobaka Centrum)	School	1	20
	Bus Stop	13	5-10
	Recreational Site	6	20
	Church	2	30
	Sales Stand	36	5-10
	Muster Point	22	5-10
	Logging Company	7	20
Carolina Road (this is the road that diverges from the Afobaka Road at Powakka and goes all the way down to the Project site)	School	1	20
	Bus Stop	1	5-10
	Recreational Site	4	20
	Church	0	30
	Sales Stand	24	5-10
	Muster Point	7	5-10
	Logging Company	0	20
	Checkpoint	1	20
Musa Road (this is the segment of road from Afobaka Centrum to the Project road)	Muster point	2	5-10

the Project = the Sabajo Project; N-S = north-south; m = meter.

Road traffic accidents most common on the paved Afobaka Road in the Brokopondo region. From 2015 to mid-2017, a total of 40 road traffic accidents were recorded in the Brokopondo region, while two were recorded in the Carolina area.

The risk of accidents on the Carolina or Afobaka Roads is compounded by the relative scarcity of paths specifically designated for pedestrians. Most pedestrians wishing to travel along the Carolina or Afobaka Road must use the road itself, thus placing themselves at risk from traffic, much of which moves at high speed.

### Traffic Management Plan

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There are no traffic signals, stop signs, or few other traffic controls (speed bumps) along the proposed Transportation Routes, nor are there any designated pedestrian crossings (e.g., crosswalks). This lack of traffic control increases the risk of accidents, especially at intersections.

Although the Carolina Road is narrower and unpaved, it is also more sparsely settled and less-traveled, significantly reducing the risk of accidents and injuries. Only a few settlements are located within 62 km of the road. There are occasional makeshift speed bumps constructed near Powakka, generally at locations where children wait for the bus. In general, fewer traffic accidents have been reported on the Carolina Road than on the Afobaka Road.

Management of concerns of the communities along the all the transportation corridors is linked to the overall community engagement plan, which is included in the Social Management Plan.

In response to the conditions documented in the ESIA relating to potential for vehicle / pedestrian accidents, and as a result of the proximity of amenities to the transportation corridors, the Project will enact a range of controls to limit potential for issues arising as a result increased traffic on the roads. The following sections document controls that will be applied where necessary to limit potential for accidents to the extent possible.

### 3.1 Time Restrictions

Hours of operations for transport of materials are dictated by release of cargo from the port facilities, however the Project intends to transport materials during daylight hours only. Truck traffic departing any location must have sufficient time to reach the intended destination during daylight hours.

### 3.2 Speed Restrictions

- Drivers are expected to adhere to posted speed limits while on public roads.
- During transport movements where special procedures apply (cyanide, explosives) speed limits are defined within the procedures and managed by a convoy leader.
- In the event travel is required during times when children and adults are in school zones, vehicle speed will be limited to 30 km/hour.

### 3.3 Driver Training

Drivers will receive the following training:

- Project traffic rules;
- communication protocol;
- special restrictions on driving;
- community issues;
- road safety; and
- fatigue management.

### 3.4 Spill Management and Emergency Response

The transport contractor will be required to provide a Spill Prevention and Response Management Plan which identifies the driver's response to a minor spill (small amount of product spilled and

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## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Traffic Management Plan

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contained on a small area on a hard dry surface) and a major spill (either large in volume, large in area or into a sensitive environment, e.g., waterway).

Minor spills can include minor leakage from the tractor unit (mechanical) or from the cargo area (product). These spills can be contained and cleaned up by the truck driver using spill kits carried in trucks. Minor spills will be raised as an incident and reported to the Project Environmental Department. All spills will be reported at the time of incident by the driver by use of cell phone or VHF radio.

An emergency event is most likely to be either a traffic accident or major spill requiring implementation of Merian Mine Emergency Response Plan (MP-HSLP-ERP & MP-ENV-PR-04) which will be adapted to include the Project once that level of detail has been defined. In the event of an emergency, the Merian/Sabajo Emergency Response Team will be contacted. Depending on the location of the event, Newmont's emergency response may be in addition to or in conjunction with activities of local emergency services. Necessity for contact of local emergency services will be determined by the Environmental Department. Major spills will be reported to the Environmental Department, which will investigate the incident and then be responsible to report to appropriate government agencies.

## 4 RESPONSIBILITIES

Facility/Activity	Responsibility
Truck maintenance	Contractor, with oversight by Newmont
Investigate complaints	Social Responsibility Superintendent
Driving to meet standards	Contractor/Project Logistics with Environmental oversight
Driver training	Contractor
Clean up minor spill	Contractor/Project Logistics with Environmental oversight
Emergency major spill response	HSLP Manager/Project Logistics with Environmental oversight
Reporting major spill to Government Agencies	Environmental Manager

Newmont = Newmont Suriname, LLC; HSLP = Health, Safety and Loss Prevention.

## 5 MONITORING

Task	Frequency	Responsibility
Truck Speed – Method to be determined	Continuous	Project Logistics
Actual number of truck movements by product type	Monthly	Project Logistics
Route monitoring	Continuous	Project Logistics

the Project = the Sabajo Project.

## 6 REPORTING

### 6.1 Internal

Any complaint regarding heavy vehicle transport is investigated and reported to Project Senior management.

Any spill, either minor or major is recorded as environmental incident.

**6.2 External**

Major spills will be reported to the appropriate government agencies by the Project Environmental Manager.

**7 CONTINGENCY PLAN**

<b>Contingency</b>	<b>Plan</b>
Minor spill	Safely control area Contact supervisor Contain and clean-up spill Report incident to Merian/Sabajo Environmental department Transport any contained material back to Merian Site
Truck accident or major spill	Contact emergency response team Send emergency response if close to Merian/Sabajo Sites Implement measures to protect people Contain and recover any spill material Conduct other measure dependent on the situation Report incident to the Merian Environmental department Merian Environmental department to determine government agencies to be contacted
Community complaint	Initiate an investigation into the action Follow-up complaint and ensure issue is concluded
Inappropriate truck driver behaviour	Investigate complaint
Driver is becoming fatigued	Pull over and rest for as long as required to feel refreshed. Driver to advise supervisor.

**8 AUDIT AND INSPECTION**

Trucks are inspected at the beginning of each shift to ensure they are in sound mechanical condition and there is no damage to trailers that may compromise performance.

Contractors are responsible to maintain vehicles on a regular basis and maintain maintenance records for each piece of equipment contracted to the project.

The project may at its discretion request a full mechanical inspection of any vehicle contracted to perform transport.

**9 MANAGEMENT REVIEW**

This plan will be reviewed by the Management team on at least annually or more regularly if changes to heavy vehicle transport occur.

**10 REFERENCES**

<b>Reference</b>	<b>Title</b>
IFC (International Finance Corporation). 2007.	Environmental, Health, and Safety General Guidelines. April 30, 2007.

March 2018

# SABAJO PROJECT

# ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

# HERITAGE ENVIRONMENTAL PROTECTION PLAN

Report No. 1669326





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## **Abbreviations and Units of Measure**

<b>Abbreviation</b>	<b>Definition</b>
GIS	Geographic Information System
ICOMOS	International Council on Monuments and Sites
m	meter
Newmont	Newmont Suriname, LLC
the Project	the Sabajo Project

## 1 INTRODUCTION

The intent of this Heritage Environmental Protection Plan is to provide detailed instructions on the following topics:

- required management of heritage sites in the Sabajo Project (the Project) area; and
- appropriate response to the unexpected discovery (Chance Finds) of suspected archaeological and historical resources during Project activities.

Given access constraints and uncertainty around the location of some of the proposed Project components, not all areas of the Project have been subject to field investigation. These un-surveyed areas will be assessed by the Heritage Specialist prior to, or concurrent with, proposed future ground disturbance activities by Newmont or its contractors.

Heritage field work has been completed for a 182 hectare area where the Sabajo, Santa Barbara, and Margo mine areas are planned (White 2017). While no previously recorded or newly identified archaeological or historical sites were in found in any of these areas, community consultation identified one previously unrecorded pre-Columbian archaeological site in the vicinity of the Santa Barbara Pit (area since developed) and an unrecorded slave route in the vicinity of the proposed Sabajo Project Footprint (Section 4.11.5).

The Heritage section of the Social Management Plan is consistent with internationally recognized good practice as described in the International Council on Monuments and Sites (ICOMOS; 1990) Charter for the Protection and Management of the Archaeological Heritage and the Government of Suriname Monument Law of 2002 for immovable archaeological resources.

Important definitions for this management plan are as follows:

- **Active Archaeological Site** – an archaeological site that has been discovered and has not yet received a notice to proceed, allowing work to continue.
- **Archaeological Site Buffer** – a visible boundary that demarcates the buffer area around an active archaeological site.
- **Ground Disturbance** – any activity that will physically impact the surface of the ground that could negatively impact archaeological sites.

## 2 DEFINITION OF HERITAGE MANAGEMENT AREAS

Prior to ground disturbance, baseline studies occur in order to identify locations with cultural resources present. Once field studies have been completed in the vicinity, if no cultural resources are found, then Project areas are cleared for development (i.e., all areas are unmarked areas as in Table 1). If cultural resources are found, either in baseline studies or through chance-find, then a Newmont Suriname, LLC (Newmont) Cultural Resource Contractor will be responsible to determine, flag and map an appropriate buffer area (Archaeological Site Buffer) around the active discovery areas. The mapped areas will be posted for all site personnel to be aware of.

### 3 HERITAGE SITE MANAGEMENT REQUIREMENTS

Newmont will provide those or employees or contractors who will clear or excavate land with maps and GIS shapefiles showing the location of known tangible heritage sites (if any) in their work areas. Table 1 below describes each of the special management requirement classifications for heritage sites in the work areas. If work is to be conducted within 500 feet (150 meters [m]) of a marked area, the employee or contractor should conduct a pre-work meeting with Newmont to confirm the tangible heritage site can be avoided. Should the employee or contractor have questions or require clarification, they will contact the Newmont Suriname Representative. As required, Newmont will coordinate support from a Heritage Specialist for the Contractor. A contact sheet will be developed containing the information in Appendix A to facilitate communications.

Newmont will be responsible for providing the employee or contractor with updated mapping to indicate a change of status in accordance with Table 1.

**Table 1 Heritage Site Requirements**

Heritage Site Map Classification	Heritage Management Requirements
All Unmarked Areas	<ul style="list-style-type: none"> <li>▪ Implementation of Chance Find Procedures</li> </ul>
<div style="border: 1px solid black; background-color: #d9ead3; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> <p><b>GO</b></p> </div>	<p><b>GO ahead with Work.</b></p> <ul style="list-style-type: none"> <li>▪ Heritage requirements have been met.</li> </ul>
<div style="border: 1px solid black; background-color: #f4cccc; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> <p><b>HOLD</b></p> </div>	<p><b>HOLD, no work zone, until Heritage Work is completed.</b></p> <ul style="list-style-type: none"> <li>▪ No ground altering work is permitted in this area until the Heritage Specialist has completed a field inspection and implemented any required mitigation measures <b>OR</b> has provided a letter indicating that the area in question has low potential for tangible heritage resources and that the contractor may proceed using Chance Find Procedures.</li> <li>▪ Once heritage work has been completed by Heritage Specialist, Newmont will provide the Contractor with updated mapping to indicate a change of status to Green-Go.</li> </ul>
<div style="border: 1px solid black; background-color: #f8cbad; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> <p><b>STOP</b></p> </div>	<p><b>No Work Zone</b></p> <ul style="list-style-type: none"> <li>▪ The Heritage Specialist will erect a barrier around Red-Stop heritage sites, with “no work zone” signage at the barrier.</li> </ul>

## 4 CHANCE FIND PROCEDURES

Procedures for chance finds of suspected heritage remains are presented below.

### 4.1 Reportable Chance Finds

The following are reportable chance finds under this procedure:

- archaeological sites, features (e.g., fire hearths) or objects (e.g., artifacts);
- known or suspected human remains of any age; and
- historical sites that contain material that is at least 50 years old.

The following are **NOT** reportable chance finds under this procedure:

- historical chance finds that are less than 50 years old.

All employees engaged in ground disturbance will receive an information package in advance of their work, describing what kinds of objects should be looked for and reported.

#### 4.1.1 Initial Response by Contractors

If suspected archaeological or historical objects are encountered, the following chance find management procedures should be implemented by the Contractor immediately:

- Step 1: Stop work in the immediate vicinity of the suspected find in accordance with Newmont's Stop Work Procedure. Do not undertake further work that could disturb the immediate vicinity of the suspected find site, including the transport of soil or rock to or from the immediate vicinity of the site.
- Step 2: Employee or Contractor's Representative will contact Newmont's Representative (contact information will be in a form such as Appendix A).
- Step 3: Newmont's Representative will contact the Heritage Specialist and advise the Contractor's Representative of further action.
- Step 4: If further action is required, the Employee or Contractor's Representative will work with the Heritage Specialist to coordinate the attendance of the Heritage Specialist at the work site.

#### 4.1.2 Understanding Next Steps and Potential Schedule Impacts

##### A. Suspected Archaeological and Historical Resources

If the Heritage Specialist is called for advice, depending on the nature of the situation, one of the following is likely based on a conversation with the Heritage Specialist about the find:

- Newmont's Representative may determine that there are no further concerns, and that there would be no restrictions placed on work continuance due to the suspected find. Contractor work can resume.

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## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Heritage Environmental Protection Plan

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- Newmont's Representative may ask the Heritage Specialist to attend in the field to determine the nature of the suspected find, in which case the work would remain stopped in the immediate vicinity of the find. If the Heritage Specialist is called to attend in the field, they will provide advice to Newmont's Representative on the nature of the suspected find, and whether or not further management options are recommended.

#### **B. Suspected Human Remains**

If the Heritage Specialist is called for advice and confirms the presence of human remains, the following procedures will be implemented:

- If the Heritage Specialist determines the remains are "recent" (i.e., forensic), he/she will ask Newmont to contact the local policing authority.
- If the Heritage Specialist determines the remains are "archaeological", he/she will contact Government of Suriname and will work with Newmont's Representative, the Contractor and applicable local groups to implement required steps.
- If the human remains are not archaeological in nature (i.e., forensic), the local policing authority and will provide guidance with respect to next steps.

#### **4.1.3 Potential Management Options**

In the event that an archaeological site or historical site is present (intact or disturbed), the Heritage Specialist will work in consultation with Newmont's Representative and the Contractor to determine the most appropriate course of action. The following options will be considered.

- **Option 1:** Avoidance through project redesign. This option avoids impact to the archaeological or historical site and has the potential to minimize schedule impacts for Construction.
- **Option 2:** Application of site protection measures. Site protection measures may include both temporary and long term procedures. Temporary measures could include fencing or a barricade to protect the site, while longer term solutions could include capping the site area with fill. Appropriate protection measures would need to be identified on a site-specific basis and consider all aspects of Project construction and operation. This option may delay construction in the area of the find.
- **Option 3:** If avoidance or protective measures are not feasible, systematic data recovery (e.g., documentation, surface collection and / or excavation using archaeological methods) may be required. Data recovery would impact the Project schedule for the period that it takes to complete the data recovery program. Once the systematic data recovery program has been completed construction activities may resume in that area.

#### **A. Human Remains**

If human remains are identified, Newmont's Representative and the employee or contractor should anticipate a suspension of work in the area of the burial as an appropriate protocol for handling human remains requires consultation with local groups and descendants, if identifiable. Four possible strategies are suggested below. The Heritage Specialist will be available to discuss the feasibility, strengths and weaknesses of each approach within the parameters of local laws and customs.



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## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Heritage Environmental Protection Plan

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- **Option 1:** Avoidance through project redesign. This would protect the remains from further disturbance;
- **Option 2:** For burial sites that will be adversely affected by Project activities, relocation is an option. In such instances, consultation with descendants (if known) is important to address how the remains would be recovered, how they would be transported, who would be involved with the relocation process, what ceremonies (if any) should be performed and by whom, and to where the burial should be relocated. Newmont and contractors must be aware that the excavation of human remains and subsequent reburial may involve ceremonies or procedures that could delay construction;
- **Option 3:** Capping – placing a protective cover (e.g., sand, gravel) on top of a burial site as a means of protecting the remains from disturbance may be an option for some burial sites. In such instances, consultation with descendants (if known) is important to address how the remains would be covered and what ceremonies (if any) should be performed and by whom. Burial site capping may involve ceremonies or procedures that could delay construction; or
- **Option 4:** Depending on the wishes of any known descendants, other suggestions may be made with respect to mitigation of burials prior to disturbance, such as commemoration of the location, leaving them in their current state, or other options that may be suggested.

## 5 INCIDENT DEFINITION & REPORTING

### 5.1 Heritage Incident Definition & Reporting

Each Newmont employee and contractor is responsible for being in compliance with the Heritage Management Plan. A Heritage incident is defined as a breach of the procedures listed within Sections 2 and 3 above for heritage resource management. All Heritage Incidents must be reported in accordance with contractor's incident reporting procedure.

## 6 REFERENCES

ICOMOS (International Council on Monuments and Sites). 1990. Charter for the Protection and Management of the Archaeological Heritage. International Council on Monuments and Sites, Paris.

White, Cheryl. 2017. Tangible Heritage: Produced in support of Sabajo ESHIA report (final report). Unpublished report on file with Newmont Suriname.

# **Appendix A      Example Contact Information Form**

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## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Heritage Environmental Protection Plan

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#### Newmont Representative

Lead contact for Contract and Construction, and first point of contact for urgent heritage notifications including Chance Finds and Incident reporting.

Name:	Name:
Phone:	Phone:
Mobile:	Mobile:
Email:	Email:
Fax:	Fax:

#### Heritage Specialist Contact Information

Heritage experts reviewing Heritage EPP content, undertaking onsite heritage work (Chance Find response and Post-Ground disturbance), and ensuring Heritage permits requirements are met.

Name:	Name: (Alternate)
Phone:	Phone:
Mobile:	Mobile:
Email:	Email:
Fax:	Fax:

#### Newmont Heritage Support

Planning support for Heritage program implementation, including Heritage Map maintenance.

Name	Name (Alternate 1)	Name (Alternate 2)
Phone:	Phone:	Phone:
Mobile:	Mobile:	Mobile:
Email:	Email:	Email:
Fax:	Fax:	Fax:

#### Contractor Heritage Lead Contacts

Environmental monitor and lead heritage contact within Contractor team.

Role:	Role: Environmental Monitor
Name:	Name:
Phone:	Phone:
Mobile:	Mobile:
Email:	Email:
Fax:	Fax:

March 2018

# SABAJO PROJECT

## ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

## EROSION AND SEDIMENT CONTROL PLAN

Report No. 1669326



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## Abbreviations and Units of Measure

<b>Abbreviation</b>	<b>Definition</b>
%	percent
BMP	Best Management Practice
cm	centimeter
CN	curve number
ECD	erosion control dam
ECI	Erosion Control Inspector
ESC	Erosion and Sediment Control
H	horizontal
ha	hectare
HEC-HMS	Hydraulic Engineering Center - Hydraulic Modelling System
km	kilometer
m	meter
mm	millimeter
NIMOS	National Institute of Environment and Development in Suriname
NRCS	National Resource Conservation Service
OS	ore stockpile
SPCC	Spill Prevention and Control and Countermeasures Plan
the Project	the Sabajo Project
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
V	vertical
WRF	waste rock facility



## 1 INTRODUCTION

This Erosion and Sediment Control (ESC) Plan provides guidance for methods to address disturbances caused by mine construction and operational activities in order to reduce the potential for soil erosion and sediment-laden surface water leaving the site.

### 1.1 Erosion and Sediment Control Plan Scope

The ESC Plan addresses soil erosion, channel erosion, and removal of total suspended solids (TSS) from surface water flow. The ESC Plan does not address the water quality of runoff or groundwater that might be impacted by geochemical processes, chemical spills, chemical handling, or the impacts of mine processes, which are addressed in other documents such as the Geochemical Baseline Report (Golder 2018). Potential impacts from chemical handling and spills will be addressed in the mine's Spill Prevention and Control and Countermeasures Plan (SPCC).

Ore will be processed at the Merian Facility located approximately 30 kilometers (km) to the east. During development and operation of the Sabajo Project (the Project), major earthworks will be required to construct the mine facilities. These major earthworks will cause disturbance to the existing vegetative ground cover, which will increase the potential for erosion caused by surface water runoff. The goal of the ESC Plan is to reduce the amount of suspended sediments in the water leaving the mine site, in order to minimize the impacts on downstream waterways. The major earthworks include the construction and operation of the following mine facilities:

- Mine site haul roads and other access roads;
- Sabajo-Merian Haul Road;
- open pit mines;
- waste rock facilities (WRFs);
- ore stockpile (OS);
- diesel generation Station and temporary fuel storage;
- effluent water treatment plant;
- storm water runoff ponds and sediment ponds;
- borrow and stockpile areas;
- accommodation camps, maintenance shops, potable water treatment facilities, and sanitary treatment facilities; and
- landfill and waste management facilities.

Major project facilities, including surface water conveyance and control facilities, are shown on Figure 1.





## 1.2 Categories of Erosion Control Measures

The ESC Plan centers around three categories of ESC measures based on their location in preventing sediment-laden water from exiting the site:

- **Source Controls:** Actions implemented directly at the disturbed area, which are designed to prevent erosion processes and reduce the quantity of suspended sediments in water leaving the disturbed area. These actions are referred to as Best Management Practices (BMPs) adopted by the mining industry at many locations. Recommended source control measures are identified and described in Section 3.
- **Intermediate Controls:** Actions implemented downstream of disturbed areas in shallow concentrated flows and channel flows traversing the mine site, which are designed to reduce erosion caused by surface water flow and promote settlement of suspended sediments. These are also BMPs. Recommended intermediate control measures are identified and described in Section 4.
- **Perimeter Controls:** Ponds constructed at the downstream extents of the site where water is leaving the site. The perimeter control measures for this site are the sediment ponds described in Section 5.

## 1.3 Construction and ESC Implementation Sequence

The Project construction must be planned with respect to the sequence of disturbances and implementation of associated ESC measures. The general construction sequence presented below will minimize erosion and sediment impacts caused by the construction of mine site facilities.

1. Construct access and/or haul roads (including the Sabajo-Merian Haul Road) and staging areas for the new facility, stabilizing the roadway base and surfacing materials as construction proceeds. Simultaneously, construct source and intermediate controls applicable to this activity. Limit clearing of vegetative cover to areas needed to install ESC BMPs (limit extend of right-of-way clearing to the minimum needed for proper drainage and safety).
2. Construct ponds downstream of the planned disturbance. Construct source controls associated with the construction of any erosion control dams (ECDs) or excavated ponds.
3. Construct the intermediate controls (such as check dams, sediment traps, and conveyance channels) when working upstream from the ECDs and ponds up to areas of planned disturbance.
4. Construct diversions or barriers that direct clean run-on water around the planned disturbance or work areas.
5. Begin clearing and construction of planned mine site facility. Use adaptive controls to augment any BMPs that are not functioning as intended. If no grading is required, the clearing should consist of cutting vegetation down without grubbing and leaving stumps and roots of trees in place.
6. Stabilize disturbed areas as the work progresses using the source control BMPs such as seeding and mulching and slope contouring.
7. Regularly maintain all ESC measures, remove trapped sediments, and use adaptive controls as needed to reduce the amount of sediment-laden water from leaving the site.
8. When construction activities are complete, remove source controls that are no longer required. Retain intermediate and perimeter controls until closure or progressive closure renders them unnecessary.

The sequencing of construction and implementation of BMPs are critical to the prevention of erosion and sediment transport. Whenever possible downstream ECDs or ponds should be in place prior to the initiation of construction.

Source and intermediate BMPs should be implemented prior to and/or during activities that disturb surface soils. The erosion control measures presented in this report do not act as stand-alone controls and are intended to create a comprehensive erosion and sediment control system from upstream of planned disturbances to the downstream extents of the Project. Additional erosion control systems may be installed in conjunction with the various phases of construction, as necessary to respond to changes in site conditions.

### 1.4 Selection Criteria

Section 2.0 of this report describes possible erosion source control measures that may be suitable at various locations across the Project site. These controls were selected based on the following criteria:

- effectiveness;
- implementation, maintenance and closure costs;
- temporary vs. permanent BMP;
- availability;
- durability;
- longevity;
- technical feasibility; and
- risk/liability.

The availability of products within the region is important to the selection of a surface erosion control method. Some erosion control materials may not be available locally. Native plant species and/or local agricultural products may provide more appropriate materials.

## 2 EROSION AND SEDIMENT CONTROL FOR MAJOR EARTHWORKS

This section describes erosion control measures that can be taken at various earthworks construction facilities. Erosion control should be implemented using the general construction sequence identified in Section 1.3 and the control methods identified in Sections 3, 4, and 5. A unique site-specific plan should be developed for each planned major earthwork prior to commencing construction, and the plan should be evaluated continuously throughout all stages of disturbance. Adaptive measures should be implemented if site conditions differ, or as needed to modify or augment erosion and sediment control measures to ensure these measures function properly.

### 2.1 Haul Roads and Access Roads

Haul roads and construction roadways should be graded to follow natural contours to the extent possible, avoiding the creation of steep slopes. This grading will minimize concentrated flows, reduce the velocity of runoff, and improve re-vegetation success. Long slope lengths, which are linked to erosion development, can be minimized by using benches, terraces, contour furrows, or diversion ditches.

Stream crossings should be designed to provide stream bank stabilization, protect streambeds from damage, and minimize sediment loading from construction traffic. Whenever possible, stream crossings should be located along a straight portion of the stream, to reduce the risk of bank erosion. If it is not possible to cross along a straight section, the banks of the stream should be stabilized using riprap, concrete, mats, biobags, sandbags, or a vegetative buffer, depending on the potential for erosion. Clearing of vegetation near or at road crossings should be avoided, whenever possible, which will also reduce bank erosion.

Stream crossings should be constructed during dry periods/seasons to limit risks of major sediments discharged into the environment.

In order to maintain the roadways, prevent movement of soils due to construction and operation traffic, and reduce erosion, roadway base and/or surfacing material should be placed on all traffic bearing surfaces and staging areas. Laterite cap could be used as road and final surface capping. Based on observations at the Merian site, the laterite cap seems to protect surfaces well and the erosion control performance is comparable with gravel material. Conveyance channels constructed parallel to the roadway will reduce excessive erosion and rutting from construction traffic. These conveyance channels should divert water to a sediment pond before discharging into natural waters.

## 2.2 Stockpiles

Temporary stockpiles of soils and other materials will be constructed as part of the site works. The resulting embankments will present a risk of soil erosion. Soil stockpiles should be constructed to reduce this risk by protecting them using any combination of the source control methods discussed in Section 3. Soil stockpiles should be stabilized as soon as practical. When vegetative stabilization is not practical, stockpiles may be protected using tarps or other methods.

## 2.3 Sediment Ponds

Several dams will be constructed around the perimeter of the mine site. ECDs are discussed in detail in Section 5.0.

If necessary, the storm water runoff ponds can be provided with filter socks at each point of concentrated discharge into the environment to limit erosion of sump inlets.

## 2.4 Waste Rock Disposal Areas

The active faces of the WRFs will be continuously changing as material is added. Therefore, while the WRF is active, erosion control will be limited to benching. When a WRF face is inactive for an extended period, the slopes will be vegetated to provide erosion control.

Surface runoff and seepage from the WRFs will be routed to ECDs and storm water runoff ponds prior to discharge to the environment. The ECDs will discharge water via culverts installed through the dam embankments. Map 1 shows the conceptual water management features at the Sabajo Area (i.e., diversion channels, and other conveyance features that will route impacted water to the sedimentation facilities (ECDs and storm water runoff ponds).

## 2.5 Mine Pits

The mine pits are expected to require dewatering by pumping water out of the pits. The inflows to the pits include direct precipitation and groundwater seepage. Areas adjacent to pits will be filled and graded to divert water away from the pits.

During mining, the pit dewatering flows will be collected in a sump and pumped to a sediment pond before being discharged downstream.

## 3 SOURCE CONTROLS

Source controls address erosion before it begins, by protecting surficial soils from being detached and transported by movement of water or wind. Whenever possible erosion source controls should be used as the primary protection, with intermediate and perimeter sediment controls used as secondary protection. Typical details of the source control measures are shown in Appendix A.

### 3.1 Run-On Diversion

Diversion dikes and diversion swales (or diversion channels) are used to intercept, divert and convey surface runoff; diversion of water running onto work areas (run-on) prevents water from reaching erodible areas. Run-on diversions are typically constructed at the top of cut slopes or around the perimeter of disturbed areas. Side ditches or channels should be constructed only where concentration of flows are expected. A diversion dike is a temporary ridge of compacted soil, stabilized with vegetation that channels water away from the disturbed area. Diversion swales or channels are drainage channels lined with grass, riprap, concrete or other materials that convey runoff around the construction perimeter to a less harmful discharge location. Run-on diversion should be constructed around all disturbed areas that have an upstream contributing watershed.

Diversion dikes and channels require less maintenance than linear sediment barriers such as silt fences or fiber rolls. These dikes and channels are also more economical, and when properly constructed provide more durable erosion control.

#### **Design and Construction Considerations:**

- Run-on diversion should be constructed and fully functional before ground disturbance begins.
- Before excavation or placing fill, all trees, brush, stumps, and other objectionable materials should be removed from the path of diversion structure.
- Diversion structures should be constructed to adequately convey design flows based on evaluation of erosion potential, soil types, over-topping, flow backups and washout.
- Use in conjunction with other sediment control devices as necessary to prevent erosion in newly constructed diversion structures.
- Stabilize swales or channels as appropriate considering expected flow velocities.
- Compact placed fill to avoid settlement issues.
- Grade channel to maintain positive drainage to a stabilized outlet, adjusting field conditions as necessary. The channel should have no low points, or dips, where storm water can collect.
- Channel outlet protection may be required.
- For diversion structures that will be used for more than 15 days, all exposed areas should be revegetated immediately after construction.

#### **Maintenance:**

- Inspect diversion structures at least once every 2 weeks, or before, during, and after rain events, for evidence of erosion or deterioration.

### Erosion and Sediment Control Plan

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- Inspect earthen diversion dikes and swales after each major rainfall event to ensure continued effectiveness.
- Maintain dikes at their designed height. Decreases in height due to settlement or erosion should be repaired immediately.
- Inspect swales for washouts and replace lost channel lining as needed.
- Inspect linings, embankments, channel beds, and berms for accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.
- Remove temporary diversion structures as soon as drainage area has been stabilized, or upon completion of construction.

### 3.2 Grading and Benching

Grading is used to direct overland flow (runoff) on work areas away from erodible disturbed areas and towards receiving streams. Grading practices should be integrated with construction. Grading minimizes the duration of exposure and the area of erodible soils. Grading and construction in areas with highly erodible soils, or areas adjacent to receiving waters, should be limited so erosion can be controlled effectively. Design considerations should take into account existing contours, drainage patterns, vegetation, slope length, slope angle, and erosion potential.

Site grading that fits the existing topography will minimize erosion potential. Whenever possible, natural drainage patterns should be maintained. Graded areas, especially sloped areas, should be constructed in a way that will facilitate revegetation.

Benching, or grading terraces, are ridge and channel systems that reduce erosion by shortening the slope length, decreasing runoff velocities, and collecting and redistributing runoff to stable outlets. Benching holds moisture and helps trap sediments, which decreases sediment-laden runoff.

#### **Design and Construction Considerations:**

- Grading and benching are only effective if an adequate outlet is available such as a grassed waterway, vegetated area, or tile outlet. The outlet must convey water to a place where the outfall will not cause damage.
- Benching is not suitable for rocky or sandy slopes as these areas may not properly redirect flow. Excessive water permeating into the bench soil may cause sloughing.
- Graded and benched areas should be stabilized with appropriate BMP's, such as seeding and mulching, with the exception of waste rock piles.

#### **Maintenance:**

- Inspect benches regularly and after all major storm events.
- Inspect benches for erosion, washouts, and accumulation of debris and sediment. Repair as needed and remove any debris and sediment.

### 3.3 Slope Contouring

Slope contouring measures, such as fiber rolls, may be used to reduce the velocity of water traveling down a slope by effectively reducing the slope length and the likelihood of gullies forming. The



following slope contouring controls are not stand-alone practices and must be used in conjunction with other erosion control methods, primarily revegetation.

#### 3.3.1 Fiber Rolls (or Equivalent)

Fiber rolls are placed along the face of newly constructed, or recently disturbed, slopes to shorten slope lengths and reduce runoff velocities (Photo 1). Fiber rolls are small cylindrical barriers composed of biodegradable fibers, such as rice, straw, wood, coconut fibers or composted material, encased in photodegradable open weave netting. An equivalent approach suitable for the Project would be to use downed trees in a similar application.

Fiber rolls are an effective control for intercepting runoff, reducing flow velocity, relieving runoff as sheet flow, minimizing rill and gully development, and providing limited sediment retention for stockpiles and constructed slopes. Additionally, the soil and moisture trapped by the fiber rolls provide a favorable habitat for revegetation. Fiber rolls are adaptable to slope applications and contour installations. The rolls blend in with the landscape, do not obstruct revegetation efforts, and can be removed or left in place. Fiber rolls are most successful where flows do not exceed flood tolerances and are sufficient to keep the base of the roll wet during the growing season. In order for fiber rolls to be effective, they must be trenched, staked, and have sufficient diameter. Fiber rolls require relatively minimal maintenance, but removal of fiber rolls can be difficult when wet or saturated. Fiber rolls are not appropriate on slopes that are subject to creep, slumping, or landslides.

#### Design and Construction Considerations:

- Fiber rolls must be trenched, staked, and have sufficient diameter to be effective.
- Fiber rolls are not appropriate on slopes subject to creep, slumping, or landslides.
- Fiber rolls should be installed in a trench, along contour, and perpendicular to flow.
- Fiber roll spacing is dependent on slope, as shown in Appendix B.
- Begin building trenches and installing fiber rolls at the base of the slope and work uphill.

#### Maintenance:

- Fiber rolls should be inspected regularly for damage or signs of wear and tear, such as that done by equipment traffic, or for rilling below fiber rolls.
- Inspect fiber rolls immediately after a rainfall produces runoff, to ensure they remain thoroughly entrenched and in contact with the soil.
- Repair or replace split, torn, unraveled or slumping fiber rolls.
- Fiber rolls require relatively minimal maintenance, but removal of fiber rolls can be difficult when wet or saturated.
- Securely knot each end of fiber roll. Abut adjacent rolls tightly, end to end, without overlapping the ends.



*Photo 1 Example of a Fiber Roll*

Equivalent approaches to fiber rolls also exist. At the Project, downed trees have been used during the mine exploration in a similar manner to intercept flow and reduce flow velocity. Like fiber rolls, the trapped soil and moisture provide a favorable habitat for revegetation. The downed trees also blend in with the landscape, do not obstruct revegetation efforts, and can be left in place. For downed trees to be effective, they must have sufficient diameter and size (weight) for the specific flow application. Site experience has shown that downed trees with diameters of approximately 200 millimeters (mm) to 500 mm are most effective and could be placed with local labor and light equipment. Downed trees are not appropriate on slopes that are subject to creep, slumping, or landslides.

### 3.3.2 Soil Roughening

Soil roughening is the creation of soil surface roughness by mechanical means, such as sheepsfoot rolling, track walking, scarifying, stair stepping, or imprinting. Soil roughening slows runoff, enhances infiltration, moderates soil temperature, traps moisture, and aids in seed germination and root penetration.

This measure is inexpensive and can be done with readily available equipment. Soil roughening provides moderate erosion protection while vegetation is being established. Because it is easy to implement, soil roughening is especially appropriate for soils that will continually be disturbed throughout the life of the Project.

#### **Design and Construction Considerations:**

- Soil roughening is best suited for slopes that are 3H:1V or greater.
- Soil roughening should be done after final grading of all construction, in patterns that are created parallel to slope contours (perpendicular to direction of runoff).
- Soil roughening is not appropriate for rocky soils.
- Avoid excessive compaction of soil surface, as it will inhibit vegetation growth and cause higher runoff speeds.

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- Do not grade or scrape final roughened face.
- Roughened surfaces should be vegetated as soon as possible.
- Roughening could be washed away in heavy rainfall and would require re-roughening of the surface and reseeding.

#### **Maintenance:**

- Inspect roughened slopes regularly, and after major storm events. Re-roughen as required.
- Routine inspections should indicate whether additional erosion control measures are required.
- Repair areas where erosion has occurred as soon as possible by filling, regading, and reseeding.

### 3.4 Linear Barriers and Silt Fence

Linear barriers are temporary control measures that intercept sediment-laden runoff, preventing the runoff from exiting the source area. Examples of linear barriers may be silt fences, brush filters, compost berms or socks, or fiber rolls.

Silt fences are common temporary sediment barriers constructed of a synthetic filter fabric stretched across wooden or metal posts, designed to separate sediments from sheet flow runoff (Photo 2). Silt fences should be placed near the base of disturbed areas, where sediment-laden water can pond. Silt fences are intended to handle runoff from small areas and should not be used for large slopes or in areas of concentrated flow.

Silt fences should not be used where concentrated sheet flow exists, the slope length above the silt fence exceeds 100 feet, or the size of the drainage area is greater than  $\frac{1}{4}$  acre per 100 linear feet of fence.

#### **Design and Construction Considerations:**

- Install silt fences prior to major soil disturbances.
- Silt fences are not designed to handle open channel flow, and should therefore not be placed across streams, channels or drainages
- Construct silt fences near the base of disturbed areas, where sediment-laden water can pond.
- Install silt fence along a line of uniform elevation, perpendicular to the direction of flow.
- Maximize detention of storm water by placing fences as far from the toe of slope as possible, without encroaching on sensitive areas, or outside of the clearing boundaries.
- Install the ends of the silt fence to point slightly up-slope to prevent sediment from flowing around the ends of the fence.
- During excavation, minimize ground disturbance around the trench as much as is feasible and smooth the surface following excavation to avoid concentrating flows.
- Ensure that the base of the fence is securely trenched into the slope.
- Concentrated flows uphill from silt fence must be intercepted and conveyed to settlement pond.

#### Maintenance:

- Inspect silt fences weekly and before, during, and after major storm events.
- Remove sediment when it reaches  $\frac{1}{3}$  of the exposed fence height.
- Inspect regularly for areas that have been eroded beneath the fence, or for sagging or collapse in the fence, causing runoff to flow over the top. Repair deficiencies immediately.
- Inspect regularly for signs of fence clogging, which causes the fence to act as a barrier to flow rather than a filter. Clean or replace clogged sections.
- Remove fences when land disturbing activities are sufficiently completed to allow permanent soil stabilization.



Photo 2      Example of a Silt Fence

### 3.5 Stabilization

Preserving existing vegetation and promoting rapid revegetation of disturbed areas is the most efficient way to control erosion. Vegetation reduces erosion by shielding the soil surface from direct impact from water or wind, improving soil's water storage capacity, decreasing the runoff velocity, and trapping particulates in place with the root system. All disturbed areas will require stabilization and should be seeded and mulched as soon as practical. Vegetative cover can be grass, trees, or shrubs.

#### 3.5.1 Seeding

Seeding establishes a permanent, perennial vegetative cover on areas disturbed by construction activities. Seed mixtures should be based on rapid-growing native vegetation. The use of native, indigenous or naturally occurring grasses is recommended, as they will evolve in a manner that will not compete with or preclude the establishment of naturally-occurring woody vegetation. Native species will also reduce the amount of fertilizer, pesticides, and other additives required. Permanent seeding should be performed in any areas that will remain undisturbed for a year or more, and in restoration and rehabilitation areas.

Temporary seeding uses fast-growing grasses at locations where permanent plant growth is not necessary, such as disturbed areas that are likely to be redisturbed in the upcoming weeks. These areas could include soil stockpiles, sides of sediment basins, and temporary roadway embankments. Annual plants may be used for temporary seeding since they sprout rapidly and will not be required to survive for more than one growing season.

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Seeding is an economical and adaptable method of source control. Its advantage is low cost. Perennial seeding has been shown to remove, on average, 90 percent of TSS from storm water runoff (USEPA 1993). Seeding must be used in conjunction with temporary stability measures, to maintain soil until vegetation is established. Additionally, the soils may require amendment to provide sufficient nutrients for seed germination and growth.

#### **Design and Construction Considerations:**

- Seeding must be used in conjunction with temporary stability measures, to maintain soil until vegetation is established.
- Proper erosion control practices upstream of treatment areas should be placed prior to seeding. Divert concentrated flows from seeded area.
- Temporary seeding can be performed on disturbed areas that are likely to be re-disturbed.
- Temporary seeding can use annual plants, which will sprout rapidly and will not be required to survive for more than one growing season.
- Permanent seeding should be performed in any areas that will remain undisturbed for one year or more, and in restoration and rehabilitation areas.
- Seed mixtures should be based on rapid-growing native vegetation. Grasses should emerge within 4 to 28 days after seeding.
- Seed mixtures should use native, indigenous or naturally occurring grasses if possible, as these plants will evolve in a manner that will not compete with, or preclude, the establishment of naturally-occurring woody vegetation. Native species will also reduce the amount of fertilizer, pesticides, and other additives required.
- Seeding alone will not provide erosion control until vegetation is established. Therefore, seeded areas must be covered by mulch to provide protection from weather. See Section 3.5.2, Mulching.
- Seedbeds should be firm, but not compacted. Topsoil should be loose, moist, and free of large clods and stones.

#### **Maintenance:**

- Inspect seeded areas to ensure grass is growing and reseed as necessary.
- If an area has insufficient cover, re-evaluate the choice of seed and soil amendments.
- Seeded areas that become damaged due to runoff will require additional erosion control measures.

### **3.5.2 Mulching**

Seeding will not provide erosion control until vegetation is established. Therefore, seeded areas must initially be protected from weather. Mulches are temporary covers that provide immediate protection to the soil, seeds, and young plants by shielding soil from raindrop impact, increasing filtration, conserving moisture, preventing soil compaction or crusting, and decreasing runoff. Mulching can be placed using green materials (such as grass, shredded shrubs and trees), rice straw, woodchips, wood fibers, recycled paper, or gravel on the soil surface. Rice straw or chipped woody vegetation would be an acceptable, locally available material for mulching at the Project site.



### Erosion and Sediment Control Plan

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When applied to sloped areas, mulch should be anchored to minimize loss by wind or water. This can be accomplished by spraying over with a polysaccharide tackifying agent or the functional organic, non-toxic equivalent in order to bind the straw together and prevent displacement. Alternatively, the mulch may be held in place with biodegradable netting, although netting can be expensive.

#### Design and Construction Considerations:

- All mulch materials should be free of seeds.
- Adequate coverage must be maintained to prevent erosion, washout, and poor plant establishment.
- Slope face should be roughened prior to application of mulch.

#### Maintenance:

- Anchor mulches to resist wind and water erosion.
- Inspect mulched areas frequently to identify exposed areas, areas with inadequate coverage, or areas where mulch has loosened. Reseed these areas, if necessary, and replace mulch as soon as possible.
- Conduct inspections until the area is completely revegetated.

### 3.5.3 Hydromulching and Hydroseeding

Hydromulching is the application of a slurry of water, fiber mulch, and a tackifier to prevent soil erosion (Photo 3). Hydroseeding is hydromulching with the addition of seed to initiate plant growth while protecting from erosion. Placement of hydromulch requires agitating equipment and a truck mounted with a large tank and special pumping equipment. Hydromulching and seeding is often more expensive than regular seeding and mulching, and is often restricted to areas that have nearby access roads and a water supply. However, hydroseeding may be necessary in areas that are locally too steep for human access (i.e., steeper than 2H:1V); have shallow or irregular soil surfaces, with large clods, stumps or rock outcroppings. Hydroseeding may provide the most dependable results on steep slopes with limited ability to adequately anchor mulch.



Photo 3 Example of Hydromulching

## 4 INTERMEDIATE CONTROLS

Intermediate sediment control is a process of capturing soil particles after they have been detached and transported by the movement of water. Intermediate sediment controls are located at points throughout the conveyance network and are typically used to settle coarser sediments and reduce the total volume of sediment storage required at perimeter control structures. Intermediate sediment control BMPs include conveyance channels, check dams, and sediment traps. Typical details of the intermediate control measures are shown in Appendix B.

### 4.1 Conveyance Channels

Conveyance channels are designed to divert sediment-laden run-off to onsite sediment trapping devices, preventing sediments from entering undisturbed areas. Conveyance channels are effective in controlling the velocity and direction of stormwater run-off. However, when used alone, they do not have the capability to remove sediment and must be used with an appropriate sediment-trapping device. Sediment traps may be required to prohibit severe sedimentation from disturbed areas. Energy dissipaters, such as rock riprap, stone, or concrete flow spreaders may be required at the outlet of the channel.

#### **Design and Construction Considerations:**

- Lining the conveyance channel will increase the stability of the control and decrease the need for frequent repairs and maintenance.

#### **Maintenance:**

- Inspect channels at least once every two weeks or after major rain events (whichever is more frequent), for evidence of erosion or deterioration.
- Inspect slopes and channel beds for accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.

### 4.2 Check Dams

Check dams are temporary, relatively small structures placed across natural or man-made channels, across ditches along haul roads, and along channels near the base of disturbed slopes (Photo 4). Check dams are most effective when used with other sediment control measures. A check dam is intended to reduce the velocity of water flow during storm events and reduce sediment transport by allowing coarser grained sediments to settle out before water continues downstream to other controls. Check dams are constructed of materials such as rock, filter socks, logs and bags. Availability of rock will be limited during the majority of ground-disturbing construction at the Project site. Therefore, check dams could be constructed using local products such as timber, brush, or other forest or agricultural products. Wood logs or pok knocker (used as filter socks), available within the Project site, could be used if properly shaped or cut.

Check dams are appropriate for drainage areas up to about 4 hectares (ha); however, multiple check dams spaced at appropriate intervals can be effective in handling larger areas. They can be used as a temporary measure in areas where it is impractical to implement other flow control practices, such as lining the channel with riprap or vegetation.



#### Design and Construction Considerations:

- Check dams should be installed perpendicular to flow.
- Check dam height should be limited to 1 meter (m), and the center of the dam should be at least 15 centimeters (cm) lower than the edges.
- Check dams should not be built in naturally flowing streams.

#### Maintenance:

- Inspect check dams before and after major storm events, or once weekly, whichever is more frequent.
- Check dams should be inspected regularly for structural integrity, buildup of sediment and debris, and erosion along the bottom of the check dam. Repairs to dams should be made as soon as possible.
- Perform repairs immediately if erosion or settlement causes the edges of the dam to fall to a height equal to, or below the height of the center of the dam.
- Remove sediment when it reaches  $\frac{1}{2}$  the original height of the dam, as measured at the center of the dam.
- Remove check dam upon completion of construction after the contributing area has been completely stabilized.
- Install permanent vegetation or other permanent erosion protection in the location where the dam was removed.



**Photo 4** *Example of a Check Dam*

### 4.3 Sediment Traps

Sediment traps are small temporary containment areas that collect runoff from drainage areas and allow for settling of suspended sediments. These excavated areas are a supplemental control and are intended to reduce some of the sediment in water that is to be conveyed to downstream controls such as the settlement ponds. A sediment trap provides settling of smaller particles than are removed by check dams, but does not remove the finest size particles.

#### Design and Construction Considerations:

- Sediment traps have limited ability to settle the finest sediments; the finest sediments will continue to the sediment ponds.
- Sediment traps must be used in conjunction with source controls.
- Sediment traps should be designed such that they are large enough to allow sediments to settle and have capacity to store collected sediment until it can be removed.
- Runoff must pass through sediment ponds before leaving the Project site.
- Sediment traps should be limited to a drainage area of 2 ha and typically have a useful life of around 18 to 24 months.
- Sediment traps need to be accessible for periodic maintenance and sediment removal.

#### Maintenance:

- Inspect sediment traps before and after major storm events, or once weekly, whichever is more frequent, for structural damage and excessive sediment and debris.
- Inspect sediment traps after every major storm event to ensure the trap is draining properly.
- Maintain the depth of the sediment trap spillway at a minimum of 0.5 m below the low point of the trap embankment.
- Remove sediments when they reach 50 percent (%) of sediment trap capacity or 30 cm depth, whichever is smaller.
- Sediment traps should remain in operation until after construction has ended and the drainage area is permanently stabilized.

## 5 PERIMETER CONTROLS (SEDIMENT PONDS)

### 5.1 Overview

Perimeter controls at the Sabajo Area will consist of ECDs, low containment ponds and stormwater runoff ponds located downstream of all major disturbance areas including all construction areas, borrow areas, WRFs to reduce the amount of TSS leaving the mine site. The locations of these facilities are shown in Map 1 but are likely to change based on final design.

The ECDs and stormwater runoff ponds are long-term perimeter facilities that will be constructed prior to major disturbances in their respective watersheds and will remain in place throughout the life of mine, continuing to function until the sediment yield from the contributing watershed area has returned to baseline levels following reclamation.

This section discusses the design criteria and construction specifications and recommendations of the ECDs dams as well as the function of the stormwater runoff ponds and low containment ponds for erosion and sediment control.

## 5.2 Design Criteria

The ECDs will be designed to safely handle the 25-year, 24-hour storm event while maintaining a freeboard of 0.5 m between the water surface elevation and the dam crest. However, the design criteria may change during final design.

## 5.3 Hydrologic Analysis

Hydrologic analysis for the ECD pond designs were performed using the Hydraulic Engineering Center - Hydraulic Modelling System (HEC-HMS) software (Newfields 2017). The assumptions and results of these analyses are presented herein.

### 5.3.1 Precipitation

The design storm selected for the sediment ponds was the 24-hour event, with a National Resource Conservation Service (NRCS) Type III Distribution. The precipitation amounts associated with the design storms up to the 100-year event are presented in Table 1.

**Table 1 Design Storm Precipitation**

Return Period (Years)	24-hour Precipitation (mm)
25	185
50	215
100	247

mm = millimeter.

### 5.3.2 Hydrologic Model

Routing of the design storms through the ECDs was performed using the Soil Conservation Service Curve Number (CN) Method (now NRCS) and the HEC-HMS modeling program. Input parameters for the hydrologic model included precipitation and sub-basin characteristics such as curve numbers and lag time. The curve numbers were assumed based on ground cover and soil types observed around the mine site. Based on engineering judgment, the curve number associated with jungle land cover (undisturbed) was assumed to be 70, and the curve number associated with disturbed area such as WRFs was assumed to be 85. A composite CN was determined for each catchment area based on the groundcover condition. The lag time was estimated based on the NRCS lag time, potential maximum soil moisture retention.

## 6 ADAPTIVE MANAGEMENT

The Project will implement an Adaptive Water Management Plan that addresses all water management issues including sediment and erosion. The water management plan, including the proposed monitoring plan and the adaptive aspects of the water management plan are presented in the Water Management Plan (Golder 2018). This section briefly discusses the sediment and erosion aspects of the adaptive water management plan.

## 6.1 Inspection and Maintenance

In order to ensure effective and adequate erosion sediment control, the source, intermediate and perimeter controls must be inspected and maintained on a regular basis. Prior to commencement of construction activities, erosion and sediment controls should be inspected by an Erosion Control Inspector (ECI). The ECI should inspect control measures on a regular basis, during all phases of mine construction up to and including mine closure. The ECI will be responsible for monitoring the control measures and construction activities and adjusting, modifying, and installing additional controls to address evolving conditions. The ECI should maintain accurate records of inspection, maintenance, and corrective actions as they apply to sediment and erosion control activities.

Maintenance and operation of BMPs would benefit from formal employee training. Start-up training for personnel working on site, relating to inspection and maintenance of BMPs, will increase awareness of the staff and aid in timely identification of maintenance needs.

Routine visual inspections of all BMPs should be performed daily. Construction site activities can easily damage BMPs, and routine inspection and maintenance will minimize work required. Any necessary repairs should be made immediately to minimize progressive failure of BMPs. A readily available inventory of BMP supplies should be maintained during all phases of construction

All erosion and sediment control practices should be checked prior to any major storm event to ensure that BMPs are cleaned out and operating properly. All BMPs should be inspected before periods of inactivity on the site, to prepare for large rainfall events that may occur during inactive period (such as a weekend or holiday). All erosion and sediment control practices should be checked for stability and operation following every major runoff-producing rainfall.

All newly seeded areas need to be inspected frequently to ensure vegetation is thriving. All seeded areas should be fertilized, and reseeded as necessary to create and maintain a dense vegetative cover. Areas where vegetative cover is inadequate should be reseeded as soon as such areas are identified. At seeded areas that are damaged due to concentrated runoff, additional source controls may be required. If mulching is properly applied and anchored, little additional maintenance should be required; however, mulched areas should be checked after high winds or significant rainstorms to assure adequate coverage is maintained.

ECD ponds and storm water runoff ponds should be cleaned when the level of sediment reaches about one meter below the riser weir crest/pond top, or sooner. Sediment should be removed from sediment traps and inlet protection devices when approximately 50% of the storage capacity has been reached.

## 6.2 Additional Erosion and Sediment Control Measures

Numerous other methods and technologies of erosion and sediment control exist. The measures introduced as part of this document were selected as cost-effective, practical solutions for the Project. If any at time, a planned erosion and sediment control measure is not functioning as intended, additional methods of erosion and sediment control can be implemented such that the downstream water quality criteria for TSS is satisfied. Potential solutions are not limited to measures described in this document. Refer to Section 1.4 for selection criteria for proposed erosion and sediment control measures.

### **6.3 Data Collection**

Reporting of water monitoring data and results or revisions of the water management plan will be submitted to the National Institute of Environment and Development in Suriname (NIMOS, Nationaal Instituut voor Milieu en Ontwikkeling in Suriname) as required.

## **7 REFERENCES**

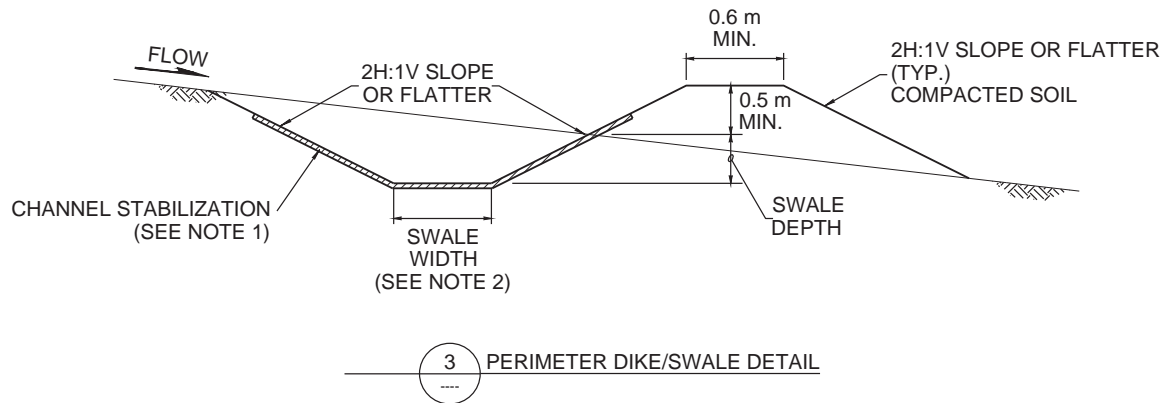
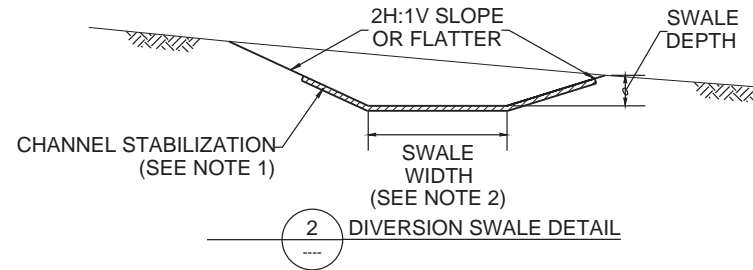
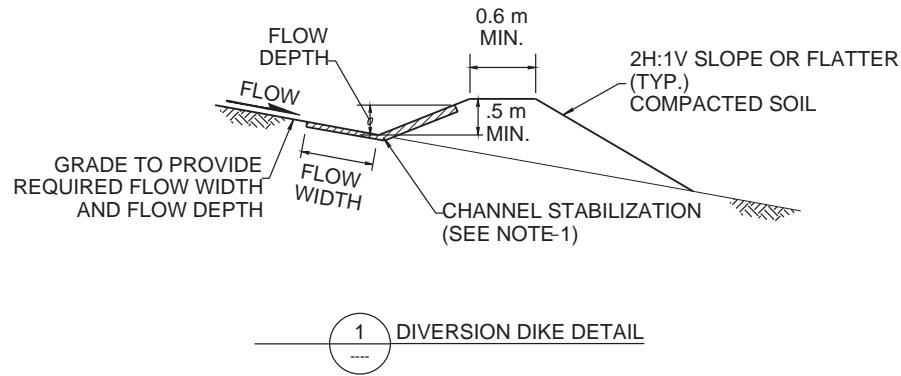
Golder (Golder Associates Inc.). 2018. Geochemistry Baseline and Source Water Quality Predictions Submitted to Newmont Suriname.

Newfields. 2017. Alternative Analysis for the Conceptual Stormwater Management Plan. Technical memorandum submitted to Newmont on September 29, 2017.

USEPA (United States Environmental Protection Agency). 1993. Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, EPA No. 840B92002

# **Appendix A Source Control Details**



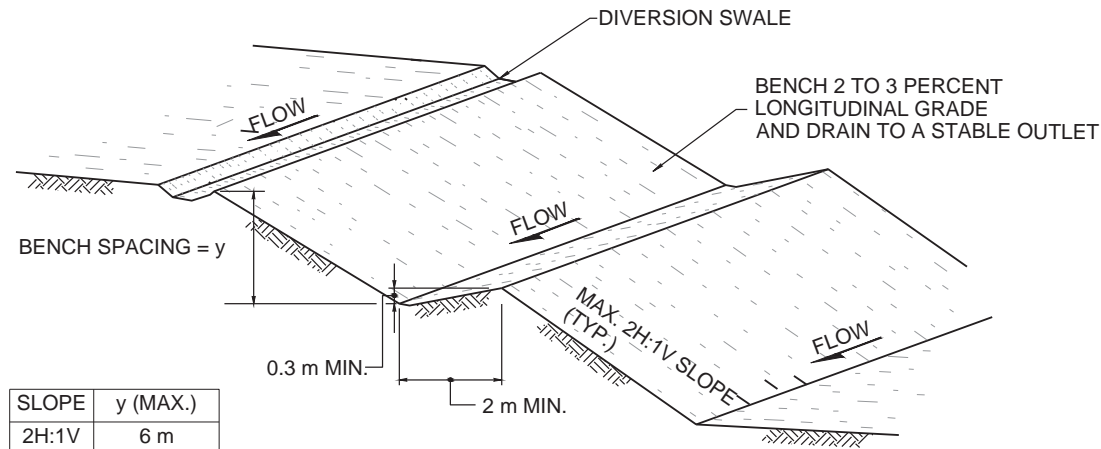


**NOT FOR  
CONSTRUCTION**

**NOTES**

1. STABILIZE CHANNEL BY LINING WITH GRASS, VEGETATION OR RIP RAP TO MITIGATE EROSION POTENTIAL WITHIN THE CHANNEL.
2. TYPICAL SWALE WIDTH IS 2 METERS.
3. ALL WORK MUST BE APPROVED BY FIELD ENGINEER PRIOR TO CONSTRUCTION.

PROJECT <b>SABAJO GOLD PROJECT</b>				
TITLE <b>TYPICAL DIKE/SWALE DETAILS</b>				
	PROJECT No.	1669326	FILE No.	ESC-Details
	DESIGN	BJV NOV. 2012	SCALE	NOT TO SCALE
	CADD	BJV NOV. 2012		
	CHECK	DL NOV. 2012		
	REVIEW	MLB NOV. 2012		
			<b>FIGURE A1</b>	




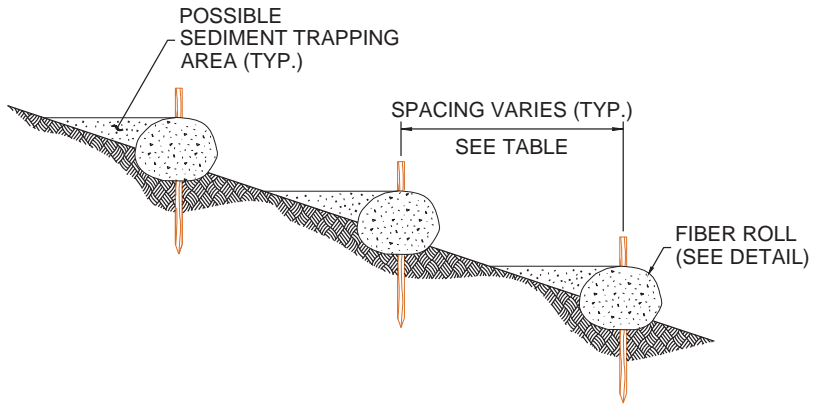
1 BENCHING DETAIL

**NOT FOR  
CONSTRUCTION**

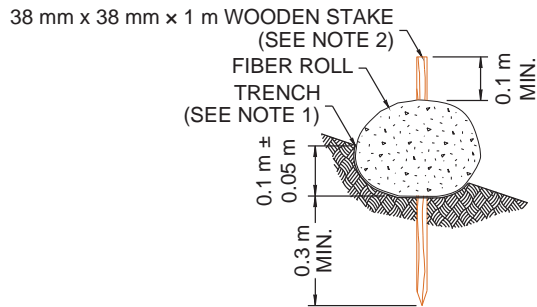
**NOTES**

1. ALL WORK MUST BE APPROVED BY FIELD ENGINEER PRIOR TO CONSTRUCTION.

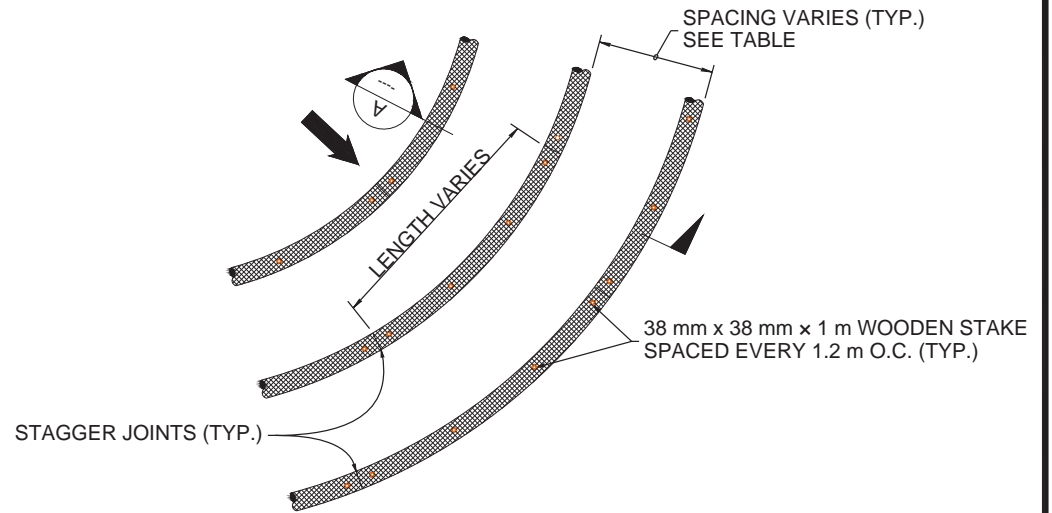
PROJECT				SABAJO GOLD PROJECT			
TITLE				TYPICAL BENCHING DETAILS			
PROJECT No.		1669326		FILE No.		ESC-Details	
DESIGN	BJV	NOV. 2012	SCALE		NOT TO SCALE		
CADD	BJV	NOV. 2012	 <b>FIGURE A2</b>				
CHECK	DL	NOV. 2012					
REVIEW	MLB	NOV. 2012					



**A** FIBER ROLL SECTION VIEW



**2** FIBER ROLL DETAIL





**1** FIBER ROLL PLAN VIEW

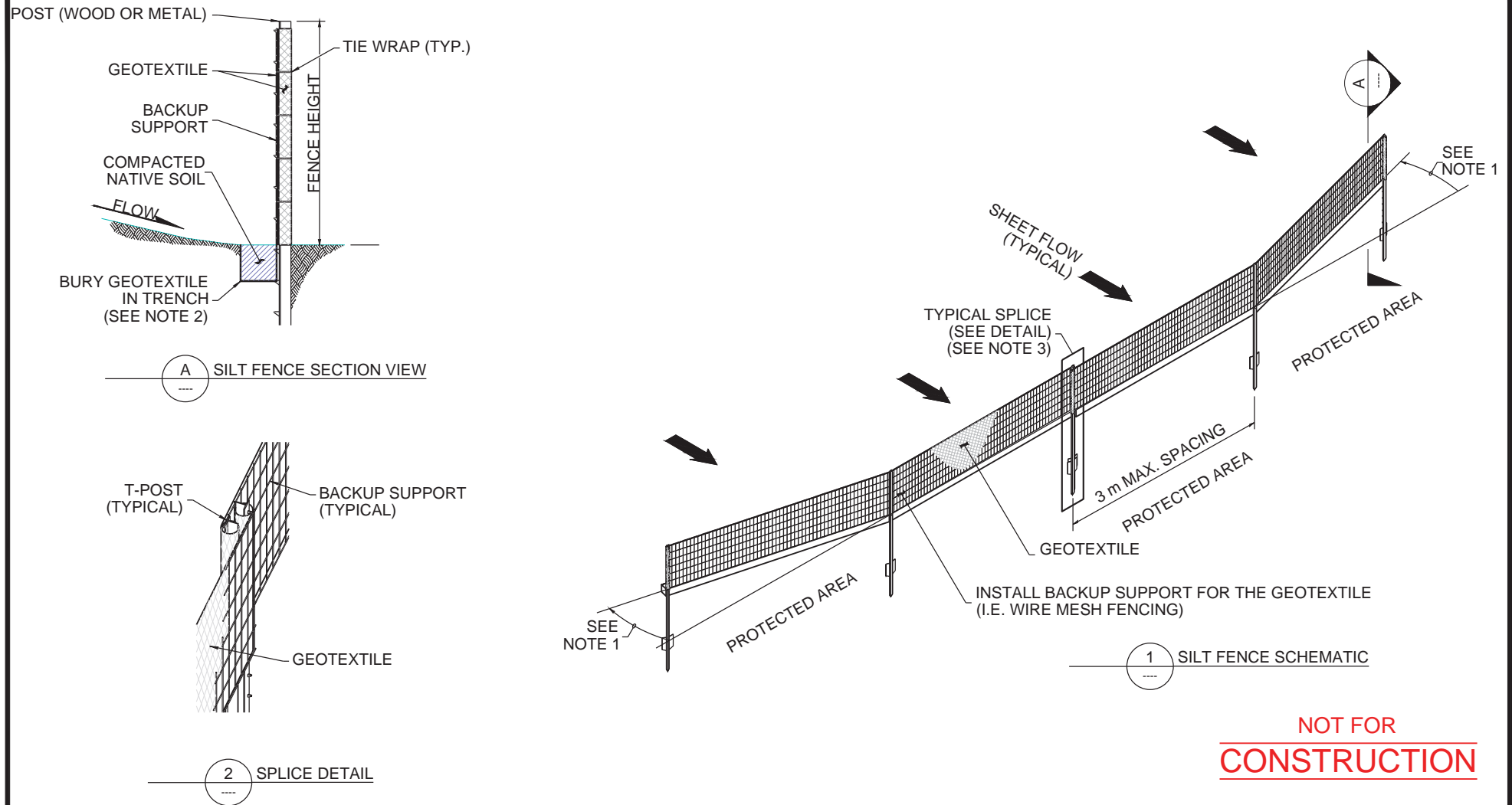
FIBER ROLL SPACING	
SLOPE	MAX. SPACING
1H:1V	3 m
2H:1V	6 m
3H:1V	9 m
4H:1V	12 m

**NOT FOR  
CONSTRUCTION**

**NOTES**

1. FIBER ROLLS SHOULD BE INSTALLED IN TRENCH, ALONG CONTOUR.
2. PILOT HOLES MAY BE DRIVEN THROUGH THE FIBER ROLLS AND INTO THE SOIL WHEN SOIL CONDITIONS REQUIRE.
3. ALL WORK MUST BE APPROVED BY FIELD ENGINEER PRIOR TO CONSTRUCTION.

PROJECT				SABAJO GOLD PROJECT			
TITLE				TYPICAL FIBER ROLL DETAILS			
PROJECT No.		1669326		FILE No.		ESC-Details	
DESIGN	BJV	NOV. 2012	SCALE	NOT TO SCALE			
CADD	BJV	NOV. 2012					
CHECK	DL	NOV. 2012					
REVIEW	MLB	NOV. 2012					
				<p><b>FIGURE A3</b></p>			



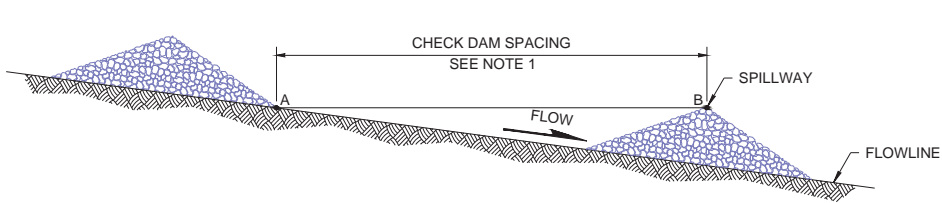
**NOT FOR  
CONSTRUCTION**

**NOTES**

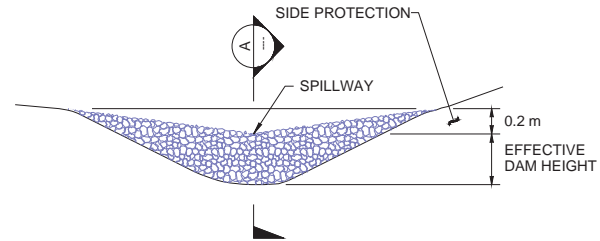
1. INSTALL THE ENDS OF THE SILT FENCE TO POINT SLIGHTLY UP-SLOPE TO PREVENT SEDIMENT FROM FLOWING AROUND THE ENDS OF THE FENCE.
2. DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENTRATING FLOWS.
3. SPLICED FENCE SECTIONS SHALL BE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP. JOINING SECTIONS SHALL NOT BE PLACED IN LOW SPOTS OR IN SUMP LOCATIONS.
4. ALL WORK MUST BE APPROVED BY FIELD ENGINEER PRIOR TO CONSTRUCTION.

PROJECT <b>SABAJO GOLD PROJECT</b>			
TITLE <b>TYPICAL SILT FENCE DETAILS</b>			
PROJECT No.	1669326	FILE No.	ESC-Details
DESIGN	BJV NOV. 2012	SCALE	NOT TO SCALE
CADD	BJV NOV. 2012	<b>FIGURE A4</b>	
CHECK	DL NOV. 2012		
REVIEW	MLB NOV. 2012		

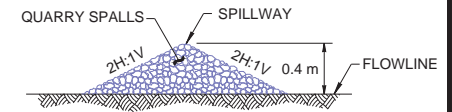
# **Appendix B: Intermediate Control Details**



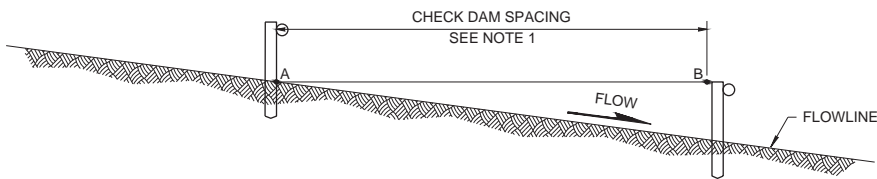
1 TYPICAL ROCK CHECK DAM SPACING



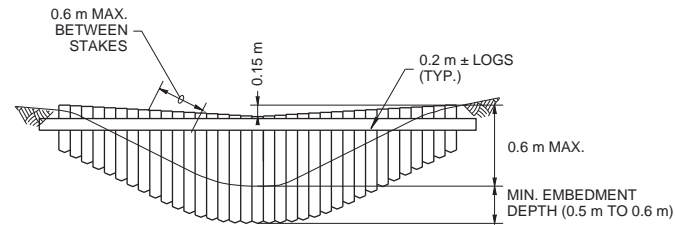
2 TYPICAL ROCK CHECK DAM - UPSTREAM VIEW



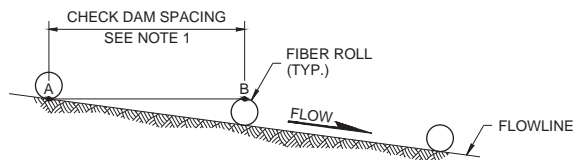
A ROCK CHECK DAM SECTION



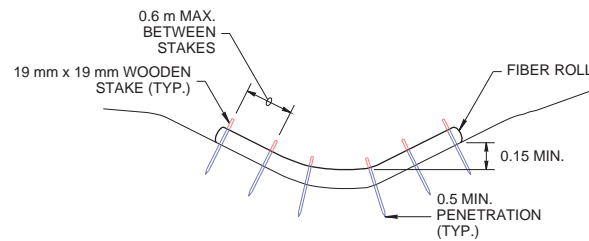
3 TYPICAL LOG CHECK DAM SPACING



4 TYPICAL LOG CHECK DAM - UPSTREAM VIEW



5 TYPICAL ROCK CHECK DAM SPACING



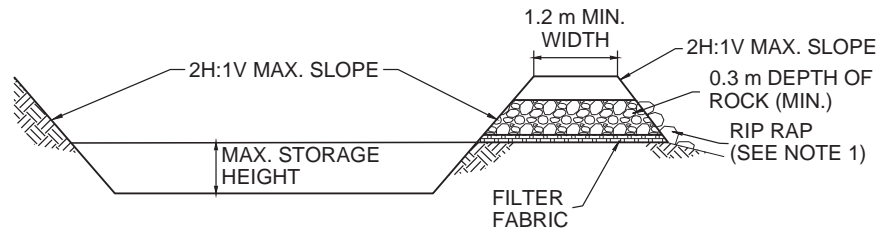
6 TYPICAL FIBER ROLL CHECK DAM - UPSTREAM VIEW

**NOT FOR  
CONSTRUCTION**

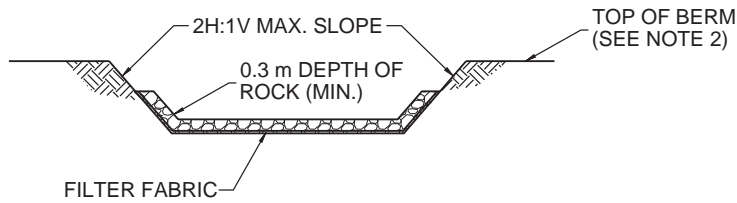
**NOTES**

1. PLACE CHECK DAMS SUCH THAT POINTS "A" AND "B" ARE AT THE SAME ELEVATION.
2. INSTALL CHECK DAMS PERPENDICULAR TO THE FLOWLINE.
3. ALL WORK MUST BE APPROVED BY FIELD ENGINEER PRIOR TO CONSTRUCTION.

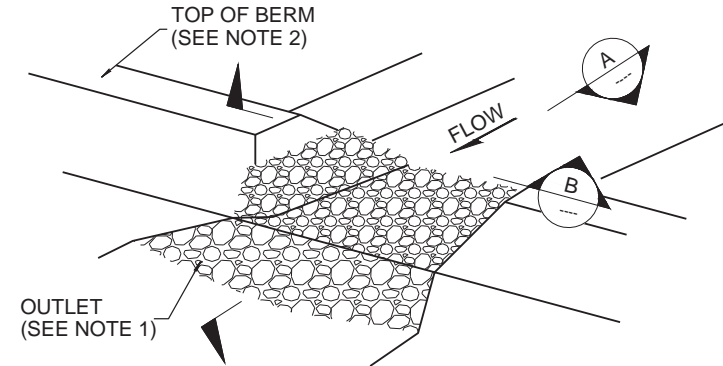
PROJECT				
SABAJO GOLD PROJECT				
TITLE				
TYPICAL CHECK DAM DETAILS				
	PROJECT No.	1689326	FILE No.	ESC-Details
	DESIGN	BJV NOV. 2012	SCALE	AS SHOWN
	CADD	BJV NOV. 2012		
	CHECK	DL NOV. 2012		
	REVIEW	MLB NOV. 2012		
<b>FIGURE B1</b>				



**A** SEDIMENT TRAP PROFILE VIEW



**B** SEDIMENT TRAP SECTION VIEW



**1** SEDIMENT TRAP SCHEMATIC

**NOT FOR  
CONSTRUCTION**

**NOTES**

1. OUTLET SHOULD USE RIPRAP, CONCRETE, OR OTHER APPROVED METHOD FOR EROSION PROTECTION AND ENERGY DISSIPATION.
2. BERM OR CHANNEL SIDE MAY BE CONSTRUCTED BY COMPACTED EMBANKMENT OR EXCAVATION INTO EXISTING GROUND, OR A COMBINATION OF THE TWO.
3. SEDIMENT TRAP OUTLET SHALL DISCHARGE TO A CONVEYANCE CHANNEL TO EITHER A NATURAL CHANNEL OR SEDIMENT POND.
4. ALL WORK MUST BE APPROVED BY FIELD ENGINEER PRIOR TO CONSTRUCTION.

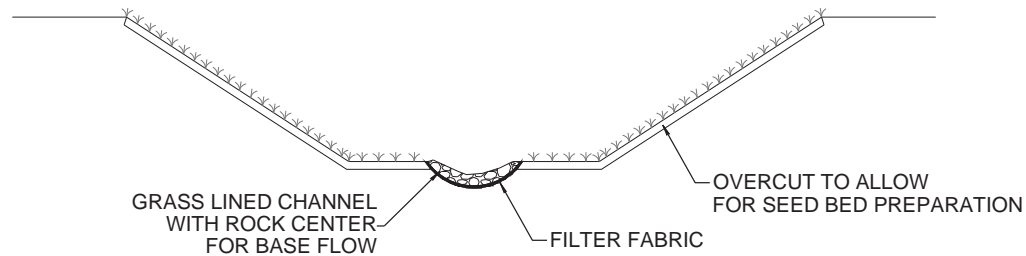
PROJECT				SABAJO GOLD PROJECT			
TITLE				TYPICAL SEDIMENT TRAP DETAILS			
PROJECT No.		1669326		FILE No.		ESC-Details	
DESIGN	BJV	NOV. 2012	SCALE	NOT TO SCALE			
CADD	BJV	NOV. 2012	 <b>FIGURE B2</b>				
CHECK	DL	NOV. 2012					
REVIEW	MLB	NOV. 2012					



1 TYPICAL V-SHAPED CHANNEL SECTION



2 TYPICAL PARABOLIC CHANNEL SECTION




3 TYPICAL TRAPEZOIDAL CHANNEL SECTION

**NOT FOR  
CONSTRUCTION**

**NOTES**

1. ALL WORK MUST BE APPROVED BY FIELD ENGINEER PRIOR TO CONSTRUCTION.

PROJECT				SABAJO GOLD PROJECT			
TITLE				TYPICAL CONVEYANCE CHANNEL DETAILS			
PROJECT No.		1669326		FILE No.		ESC-Details	
DESIGN	BJV	NOV. 2012	SCALE		NOT TO SCALE		
CADD	BJV	NOV. 2012					
CHECK	DL	NOV. 2012					
REVIEW	MLB	NOV. 2012					
				<b>FIGURE B3</b>			



March 2018

# SABAJO PROJECT

# ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

# WASTE MANAGEMENT PLAN

Report No. 1669326



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Appendix 2      Waste Segregation by Bin Color and Bin label

## Abbreviations and Units of Measure

Abbreviation	Definition
≤	smaller than or equal to
CC	Construction Camp
CMP	Container Management Plan
EC	Exploration Camp
EHS	Environment Health and Safety
ESIA	Environmental and Social Impact Assessment
ft	feet
GoS	Government of Suriname
HR	Human Resources
HSLP	Health, Safety, and Loss Prevention
IFC	International Finance Corporation
L&D	Learning and Development
mg/L	milligrams per liter
MSDS	material safety data sheet
N/A	not applicable
Newmont Suriname	Newmont Suriname, LLC.
PCB	polychlorinated biphenyl
PVC	polyvinyl chloride
SOP	Standard Operating Procedure
STP	Sewage Treatment Plant
the Project	the Sabajo Project
TPH	total petroleum hydrocarbons
TSDf	treatment, storage, and disposal facilities
USEPA	United States Environmental Protection Agency
WMP	Waste Management Plan
WRF	waste rock facility

### 1 PURPOSE

The purpose of the Waste Management Plan (WMP) is to provide the overall strategy for waste minimization and management as well as provide all personnel at Sabajo with information necessary to handle waste streams generated at Sabajo in accordance with the Newmont Suriname standards for the management of hazardous wastes, non-hazardous wastes and wastewater such that human health and the environment are protected.

### 2 SCOPE

The waste streams not covered by this plan include:

- sewage effluent or storm water;
- waste rock; and
- greenhouse gases and other by-products of combustion.

This management plan applies to all staff, contractor personnel and facilities at Sabajo Project (the Project).

### 3 OBJECTIVES

The Waste Management Plan has been developed to achieve the following objectives:

- a) protect human health and environment;
- b) comply with Environmental and Social Impact Assessment (ESIA) commitments;
- c) identify current and future waste streams;
- d) maximize reuse or recycling of waste and minimize waste going to landfill;
- e) document how waste streams will be managed including, temporary and final disposal locations;
- f) ensure hazardous wastes are appropriately managed to prevent loss of containment;
- g) establish methods of acquisition of waste data and waste reporting requirements to monitor performance and allow continual improvement; and
- h) prevent unacceptable disposal of Sabajo wastes which may cause community concerns.

## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Waste Management Plan

## 4 RESPONSIBILITY

<b>All Personnel</b>	<ul style="list-style-type: none"><li>a) Consider waste generation and disposal in all work operations; recycle as first priority.</li><li>b) Report of all waste disposed at on site Waste Facilities by using the Waste Facility Receiving Report Form</li></ul>
<b>Project Manager</b>	Ensure adequate resources are provided to manage, handle, store, transport and dispose/recycle waste products both on and offsite safely to provide protection of human health and the environment.
<b>Environmental Superintendent</b>	<ul style="list-style-type: none"><li>a) Ensure that the environmental waste management requirements and strategies are incorporated into construction and operational planning.</li><li>b) Coordinate investigations where any inspection findings relating to waste management at Sabajo are not corrected within one (1) cycle.</li><li>c) Coordinate investigations of community concerns raised relating to waste management.</li></ul>
<b>Environmental Coordinator - General Services</b>	<ul style="list-style-type: none"><li>a) Report on compliance with Sabajo's obligations for waste management.</li><li>b) Assess Hazardous Material Approval Request forms for new products and advise of waste management requirements.</li><li>c) Report on Sabajo's waste management performance in the Monthly Environmental Report.</li><li>d) Determine appropriate disposal of waste streams generated through Sabajo operations.</li><li>e) Ensure monthly waste and recycling reports and dockets are received from disposal facilities and compile quarterly recycling updates.</li><li>f) Coordinate maintenance of waste disposal register and where appropriate provide recommendations to Department Managers for increasing materials recycled.</li><li>d) Coordinate waste transfer mechanisms to disposal location.</li><li>e) Conduct periodic inspections/audits of waste management activities &amp; controls including, audits of receiver facilities.</li><li>f) Raise and maintain awareness of waste management requirements and practices amongst the workforce.</li><li>g) Maintain departmental contacts register</li></ul>
<b>HSLP Coordinator</b>	<ul style="list-style-type: none"><li>a) Provide safety and occupational health advice relating to waste management.</li></ul>
<b>Work Area Supervisors</b>	<ul style="list-style-type: none"><li>a) Coordinate disposal of waste as specified in the Waste Management Plan.</li><li>b) Identify and manage opportunities to minimize or eliminate waste within their own area of responsibility.</li><li>c) Participate in investigating environmental incidents and ensure immediate corrective action is carried out.</li></ul>

HSLP = Health, Safety, and Loss Prevention.

## 5 INTRODUCTION

### 5.1 Background

A variety of waste is generated at Sabajo with the potential to impact on human health and the environment. Waste can impact fauna, soils and groundwater, create odor and pest problems, can be aesthetically detracting and generate concern amongst employees, contractors and the wider community. Landfills also occupy land which impacts future land use options.

Best practice management aims to reduce waste generation by characterizing waste streams so they can be re-used, recycled or disposed at the appropriate facility.

### 5.2 Potential Risks

The major risks associated with waste management relate to but are not limited to hazardous wastes. The major risks are summarized below:

- Human health:
  - exposure to fibrous wastes, scrap radiation devices or other carcinogenic wastes;

### Waste Management Plan

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- chemical burns from poor handling of reactive wastes;
- disease from putrescibles, sewage and medical wastes and pests attracted to waste;
- explosion/fire of inappropriately stored combustible wastes; and
- hazards from poorly managed wastes such as spilled oils, poor housekeeping of waste.
- Environment:
  - contamination of soil and water from organic wastes; and
  - injury of fauna from ingesting or becoming caught trying to access waste for food.
- ESIA Compliance:
  - associated with fulfilling commitments from the ESIA and associated management plans.
- Social Responsibility:
  - poor waste management practices impact social relations;
  - poorly secured loads when waste is removed from site results in poorly controlled waste; and
  - disposal of recyclable wastes impacts sustainability goals.

## 6 LEGAL & OTHER REQUIREMENTS

To date, Suriname does not have an approved environmental policy and there is no legislation dealing specifically with environmental management. Environmental legislation, however, is currently being developed and draft regulations for environmental assessment have been released. In addition, there

are several government policies that concern sustainable development and biological resources, including the Government Declaration, the Multi-Annual Development Plan, and the National Biodiversity Strategy.

Apart from that there are also several conventions related to waste and chemicals that have been ratified by Suriname such as the Stockholm convention (Persistent Organic Pollutant) in 2011, the Basel Convention (Transboundary Movement of Hazardous Waste) in December 2011 and the Rotterdam convention (Pesticides and Industrial Chemical Management) in 2000.

The proposed Project will comply with the Government of Suriname (GoS) environmental regulations and other relevant existing legislation, including government policy documents. Responsibility for environmental and natural resource management in Suriname is fragmented between different pieces of legislation and amongst different government institutions. Newmont Suriname is committed to complying with the draft and promulgated regulations at the time of this project permitting.

### 6.1 Suriname's Environmental Law Requirements

Suriname's legislation at the national level is exercised through Laws or Acts of Parliament (Wet, also called Verordening and Landsverordening prior to 1975), Decrees (Decreet)<sup>1</sup>, Government Decree (Staatsbesluit), Presidential Decree (Resolutie), Presidential Orders (Presidentieel Besluit) or Ministerial Orders (Ministeriële Beschikking) targeting various sectors including industry, tourism, nature conservation, etc.

### Waste Management Plan

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The Hindrance Act (Hinderwet, 1930, 1944, and 1972) defines the permit requirements to control noise and air pollution for industrial development projects. The permits are issued and enforced by local District Commissioners (Buursink 2005; SRK 2007); however, the Act's effectiveness has been negatively impacted by outdated and inadequate regulations concerning inter alia pollution standards and waste management, and a lack of sufficient resources to conduct monitoring inspections (Buursink 2005; SRK 2007).

*The Police Criminal Law GB.1915 no. 77 – Article 39a*, which is implemented by the Ministry of Justice and Police, penalizes the disposal of waste in public places.

## 6.2 Environmental and Social Impact Assessment

The Project has committed to base its solid waste management plan on guidance provided in the IFC's Performance Standard 3, IFC EHS Guidelines for Waste Management Facilities (2007a), and General IFC EHS Guidelines (2007b). The Project's Environmental Design Criteria further describes the commitments and approach of Solid Waste Management.

## 6.3 Other

Sabajo is also committed to demonstrating conformance with the following:

- Newmont Environmental Standards – Waste Management (NEM-SER-STA-007), Hazardous Materials Management (NEM-SER-STA-005);

## 7 MANAGEMENT STRATEGY

### 7.1 Overview

Sabajo's waste management strategy recognizes that waste needs to be managed from generation to post-disposal, including, segregation, temporary storage, transportation, and final disposal. Furthermore, Sabajo's waste management strategy recognizes that prevention and minimization of the generation of waste is fundamental to the Project's waste management plan. Specifically, the strategy involves the following stages:

1. Systematically identifying streams;
2. Identifying relevant requirements on these waste streams;
3. Assessing the significance of each waste stream in terms of:
  - a. potential impacts on human health;
  - b. potential effects on the environment;
  - c. the quantity and frequency of generation;
  - d. special management and disposal for complying with requirements for hazardous waste; and
  - e. potential community concerns.
4. Segregation of waste at the source;
5. Prevention, minimization, re-use, recycling and/or control of waste; and
6. Disposal of non-hazardous waste to the landfill, which is considered as the last resort once all other avenues have been exhausted.



## 7.2 Identification of New Waste Streams

As new products are brought to site, consideration needs to be given to whether the waste generated can be managed with existing waste streams or create a separate waste stream requiring specific management.

New products and their potential waste streams are assessed in accordance with Sabajo's new product request procedures PUR-019 Straight PO's and PUR-005 Item Creations v3.0. New products should be risk assessed for safety and environmental related issues. If a product is approved that creates a new waste stream, appropriate conditions will be applied to ensure any waste generated is managed appropriately and this plan will be updated accordingly.

## 7.3 Segregation of Waste Streams

All waste streams must be segregated appropriately. Recycling bins are provided at key points around the site to encourage segregation of waste, particularly where there is a high volume of a waste type generated. Hazardous waste is not permitted to be mixed with or stored in the same location as non-hazardous waste, as there is a risk of cross contamination occurring.

## 7.4 Location of Major Waste Facilities

Major waste facilities at Sabajo are listed below:

### ■ Recycling Laydown Area

- The recycling laydown area is located at the construction camp. This facility is equipped with containers for temporary storage of plastic bottles, Electronic waste, Paper and scrap metal.

### ■ Temporary Waste Facility

- This waste facility is located at the construction camp. This facility will be equipped with a shed for storage of hazardous and non-hazardous waste as well as a volatilization pad for treatment of contaminated soil.

### ■ Non-Hazardous Waste Disposal Facility Landfill Area

- The landfill area, located in the footprint of the Southern Waste Rock Facility (WRF) will have three landfill pits designated for Common Garbage, Food waste and Sewage.

## 8 WASTE DISPOSAL METHODS

The tables below describe the identified types of waste generated at Sabajo facilities, the disposal locations and disposal methods for each type of waste. Wastes not disposed according to this Management Plan, including litter, shall be raised as an environmental incident. For the purposes of this management plan, wastes are categorized as hazardous and non-hazardous waste.

### 8.1 Hazardous Wastes

Hazardous waste shares the properties of a hazardous material (e.g.; ignitability, corrosivity, reactivity or toxicity), or other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed. Wastes may also be defined as "hazardous" by local regulations or international conventions based on the origin of the waste and its inclusion on hazardous waste lists, or based on its characteristics (IFC General EHS Guidelines for Waste

# SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

## Waste Management Plan

Management, 2007a). For the purpose of this plan the Basel Convention definitions and hazardous waste lists will be used as a guideline for defining hazardous wastes.

The Environmental Coordinator- General Services will provide advice on hazardous wastes requirements and arrange characterization to determine hazardous material classification.

Hazardous waste at the Sabajo facilities is mostly generated at the workshop.

### 8.2 Non-Hazardous Wastes

A non-hazardous waste is defined as waste that does not contain any of the following characteristics: self-ignitable, corrosive, reactive, or toxic; and is not listed in the United States Environmental Protection Agency (USEPA) hazardous waste list.

Non-hazardous waste is generated across all facilities at Sabajo.

Hazardous and Non-Hazardous Waste			
Waste Stream	Temporary Destination	Final Destination	Notes
<b>A</b>			
Aerosol cans*	Yellow bins	Dispose Off-site at Sammie's scrap	Aerosol cans will be processed as per Aerosol Can Aspirator SOP.
Aluminium cans	Blue bin designated for plastic bottles and aluminium cans at work area or Empty plastic bottle container at the Recycling Laydown area	Dispose off-site at AMRECO	
<b>B</b>			
Batteries*-(Household, Vehicle; Dry, Wet)	Store in battery boxes in work area; Hazardous Waste Facility at Marian	Dispose Off-site at BAP Waste Management	
<b>C</b>			
Chemicals*	Refer to MSDS and consult Environmental Department	Determined on case-by-case basis; detail in SPCC Plan for Hydrocarbons and Chemicals.	
Chemical Drums* (empty)	Temporary Hazardous Material Storage Facility	* Returned to supplier (clean) * Re-use for collection of aerosol can aspirator liquids * Dispose Off-site to United Rentals for recycling	
Chemicals* (Unused Laboratory)	N/A		
Coolant*	Waste Coolant container at work area; Transported to the Hazardous Waste Transfer facility at Merian	Dispose at off-site at United Rentals- Re-use	Ethylene glycol and coolant-tainted water drained from mobile equipment. Used coolant may contain characteristic or listed metals, especially if it has been drained from engines that have suffered catastrophic failure.
Contaminated Soils or Clean-up Material*	Bin labelled with 'Contaminated Soil' at work area or direct to Volatilisation Facility	Volatilization Facility at Exploration Camp	Review of MSDS and/or testing may be required to determine characterization of clean-up.
Cardboard	Common garbage bin at work area	WRF landfill pit for common garbage	
Clearing Debris	N/A	Used on rehabilitation and sediment control	
Common/ Household Garbage	Green bin for common garbage	WRF landfill for common garbage	

# SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

## Waste Management Plan

<b>Hazardous and Non-Hazardous Waste</b>			
<b>Waste Stream</b>	<b>Temporary Destination</b>	<b>Final Destination</b>	<b>Notes</b>
Concrete	N/A	Ensure clean of contaminants and use as landfilling or disposal in the WRF landfill	
Cooking Oil	Storage container in kitchen	Dispose Off-site at RE-CYC-OIL in Paramaribo	
Copper Cable	Scrap metal container	Dispose off-site at Sammie's scrap recycling	
<b>D</b>			
Diesel Fuel* - Contaminated	Hazardous Waste Transfer Facility	Dispose at off-site at United Rentals	Contaminated or off-specification diesel fuel resulting from servicing equipment and from spill clean-up
<b>E</b>			
Electronic Waste* – Computers, Printers, Copiers	Stockpiled in 20ft container at Recycling Laydown area- CC	Dispose Off-site at BAP Waste Management	
Empty Aerosol Cans*	Yellow bins in work areas.	Dispose Off-site at Sammie's scrap	Aerosol cans will be processed as per <b>Aerosol Can Aspirator SOP</b> .
<b>F</b>			
Filters* - (Oil, Coolant, Fuel, Air Filters)	Red Waste bins labelled 'Used Oil Filters' Transported to the Hazardous waste location at Merian	Dispose at off-site at Sammie's scrap recycling	Oil filters need to be crushed for proper oil drainage prior to disposal at Hazardous waste facility. Used oil, fuel, and coolant filters contain used oil, dirt, and Air filters contain dust and small amounts of used lubricant. Used oil and air filters are generated by all mobile and most of the stationary equipment on site. Filters are encased in metal or also exist as cartridge type, filter element.
Fluorescent Light Tubes (non-mercury based)	Hazardous Waste Transfer Facility	WRF Landfill pit for common garbage	
Fluorescent Light Tubes (mercury based)*	Hazardous Waste Transfer Facility	Off-site waste disposal facility- Recomsur	
Fire Extinguishers	ESO for refilling and reuse	Return to supplier / WRF landfill for common garbage	
Food scraps	Green bins	WRF landfill pit for food waste	
<b>G</b>			
Gas Cylinders		Returned to supplier	
Gasoline - Contaminated or Waste* (at Drill Shop only)	Hazardous Waste Transfer Facility	Dispose at off-site at United Rentals	Waste gasoline from fuelling vehicles, equipment, or from other releases
Grease/Open Gear Lubricant *	Grease bins	Dispose Off-site at United Rentals (Jankie)	
Glycol and de-scaling additives*	Demarcated Storage Container	Offsite Disposal at United Rentals	Dispose with Engine Coolant from Truck shop
General waste	waste bin	Landfill	
Glass	Green General waste bin	Landfill pit for common garbage	
<b>H</b>			
Hydraulic Hoses*	Red hydrocarbon bins	Dispose Off-site at United Rentals for incineration	
Hydrocarbon Affected Synthetic Absorbent Products*	Red Hydrocarbon bins (absorbent pads, socks, booms)	Dispose Off-site at United Rentals for incineration	
Hydrocarbon Affected Soil*	Bin or direct to the Volatilization pad	Bioremediation - Facility at Waste station Exploration Camp	Treatment at location can be considered with consultation of

## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Waste Management Plan

<b>Hazardous and Non-Hazardous Waste</b>			
Waste Stream	Temporary Destination	Final Destination	Notes
			Environmental department; For treatment of contaminated soil at Bioremediation facility- see Volatilization pad SOP
Hydrocarbon Affected Hard Rock*	Bunded in work area	Waste Rock Dump or other area as directed by the Environmental Department	
Hydrocarbon Drums*	1. Crushed , drained and into scrap container 2. Re-used for waste oil	Dispose Off-site at Sammie's scrap recycling	
<b>L</b>			
Lubricants*	Hazardous Waste Transfer Facility	Dispose at off-site at SOL	Used lubricating and hydraulic oil (including transmission fluid and brake fluid) generated from vehicles and machinery with minor amounts of fuel constituents and metals.
<b>M</b>			
Medical Waste*	Biohazard bins at Medical Centre	Dispose Off-site at WASPAR Incineration	
Medicine*	Biohazardous waste bin at Medical Centre	Returned to supplier	Other disposal options can be considered in consultation with the Medic and environmental dept.
Mild solvents for general parts washing*	Collected in IBC totes or other suitable containers	Dispose Off-site at United Rentals	
Mineral Solids – Laboratory	Collected in waste bins	Return to processing	
<b>N</b>			
Non-PCB Transformer Insulating Oil*	Waste Oil Tank	Dispose Off-site at SOL	
<b>O</b>			
Oily Rags*	1. Labelled oily rags Bins at work area 2. Hazardous waste location at Waste Facility Exploration camp	Dispose Off-site at United Rentals Incineration	
Oily Water*	Oil Water separator sumps	Oily water separator	Absorbent mats to be used for absorbing oil; If oil content in water is low than S200 can be used to treat the contaminated water-; Water can be discharged into the environment if TPH results are $\leq 0.7\text{mg/L}$ ;
<b>P</b>			
Paint and Solvents*	Temporary Hazardous Material Storage Facility	Dried paint – WRF landfill pit for common garbage Solvents- dispose Off-site at United Rentals	Paint will be set to dry
Pesticides containers* (empty)	Temporary Hazardous Material Storage Facility	Dispose Off-site at Amreco	The empty plastic containers need to be rinsed out 3 times prior to disposal at the Hazardous material Storage facility; The rinsed liquid should be used again.
Printer Cartridges	Designated recycling boxes in work area	Dispose Off-site at Suriname Cartridge depot NV SCD	Currently 2 collection points for printer cartridges: - Mill office - Environmental office - HR office

## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Waste Management Plan

<b>Hazardous and Non-Hazardous Waste</b>			
Waste Stream	Temporary Destination	Final Destination	Notes
Pallets	1. Warehouse 2. Stored at work area	1. Re-use 2. Returned to supplier 3. WRF landfill pit for common garbage	<b>Final destinations depends on condition of pallet.</b>
Paper	Grey bin at work area or Container for paper waste at Recycling Laydown area	Dispose Off-site at AMRECO	
Plastic bottles	* Blue bins for plastic bottles & aluminium cans at work area or Empty plastic bottle container at the Central Recycling Laydown	Dispose Off-site at AMRECO	
Plastics – Clean (buckets, wrapping)	Central Recycling Laydown- Plastic bottles & aluminium can area	Dispose Off-site at AMRECO	
Plastic Drums – Clean	Central Recycling Laydown	Dispose Off-site at AMRECO	
Plastic Containers (clean) – Laboratory	Bluebins for plastic bottles & aluminium cans recycling	Dispose Off-site at AMRECO	
PVC	Container for Plastic bottles & Aluminium cansat Central Recycling Laydown	Dispose Off-site at AMRECO	
<b>R</b>			
Refrigeration Gas *	Pressurized storage tank	Offsite Disposal at INGAS	
<b>S</b>			
Sewage*	Sewage Treatment Plant (STP)	Sewage filter cake -WRF landfill area for sewage disposal	Optional use: Fertilizer on slopes
Sewage Sludge * (dewatered filter cake)		Sewage disposal pit at the WRF area	
Screen Panels – Coarse and Fine*	Stored at work area;	Decontaminate and dispose into landfill	
Screened Sewage Material		Common garbage landfill pit at WRF area	
Sample prep baghouse bags	Non- hazardous	WRF Landfill	
Scrap Metal	Scrap Metal bin at work area	Dispose Off-site at Sammie's scrap recycling	
Styrofoam and general office waste	Green General waste office bins	WRF Landfill pit for common garbage	
Sample Lab Waste-Geology	Designated storage bin at Laboratory	WRF landfill	
Sample Preparation: Dust and Bags)	Dust that is trapped in this system is collected in drums under the baghouses. Waste bags delivered to the IW MF	WRF landfill	<b>Dust hoods over the sample crushing and grinding tables are vented to baghouses located adjacent to the laboratories</b>
Sump water and sludge	Sump	As advised by Environmental dept.	Water collected in this sump is generated by cooling the blade on the core saw and by collection of precipitation on the uncovered portion of the rock saw slab. Sludge collected is fine rock dust generated by the core saw.
<b>T</b>			
Trash Screens	Stored at work area;	Decontaminate and dispose into landfill	
Tires (HV)	Stockpiled near HV workshop up to 100 to allow tire manufacturer warranty inspection	Re-used on site for barriers or Dispose Off-site at A-Solutions	

# SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

## Waste Management Plan

<b>Hazardous and Non-Hazardous Waste</b>			
<b>Waste Stream</b>	<b>Temporary Destination</b>	<b>Final Destination</b>	<b>Notes</b>
<b>W</b>			
Wash bay sludge / sediment*		Volatilization Facility or Waste Rock dump area	TPH analyses will be conducted according to Volatilisation Facility SOP
Waste Oil*	Waste oil tank at Truck shop	Dispose Off-site at Sol	
Wood Products	Stockpiled in work area or bring directly WRF landfill for common garbage	WRF landfill pit for common garbage	

WRF = waste rock facility; SOP = Standard Operating Procedure; TPH = total petroleum hydrocarbons; HR = Human Resources; CC = Construction Camp; PCB = polychlorinated biphenyl; mg/L = milligrams per liter; ft = feet; ≤ = smaller than or equal to; MSDS = material safety data sheet; PVC = polyvinyl chloride; N/A = not applicable.

## 9 CONTAINER MANAGEMENT

This Container Management Plan (CMP) has been prepared in accordance with the Newmont Environmental Standard for Waste Management (NEM-SER-STA-007) and incorporates leading practices based on United Nations and USEPA guidelines.

### 9.1 Types of Containers

Non-liquid hazardous waste (example: petroleum impacted soil, lead acid batteries), shall be placed into either bulk roll-off bins or into clean, open- top drums, depending on the volume of waste to be contained. The construction material for any container used shall be compatible with the characteristics of the wastes being contained. The roll off container shall be covered with a tarp or other lid, and the drums should have sealing covers. Containers must be in good condition, with no damage or corrosion that would impair the ability of the container to retain waste to be stored.

All liquid hazardous wastes shall be placed into clean drums or IBC containers. The construction material for the drums shall be compatible with the characteristics of the waste to be contained. The drums should be in good condition with no damage or corrosion that would impair the ability of the drum to contain the waste to be stored. The tops of the drums should have threaded bungs in good condition that can be threaded in sufficiently to seal the drums tightly. Approximately 3 inches of headspace should be allowed in the drums to allow for expansion of the liquid.

### 9.2 Management and Labelling of Waste Containers

#### 9.2.1 Management

All containers of hazardous waste must be closed at any time hazardous waste is not being added or removed. Bin lids will be closed at any time hazardous waste is not being added or removed and no uncontained liquid hazardous wastes will be placed in these containers. Open-top drums should be sealed by tightening the sealing lid in place, installing the sealing ring, and tightening.

Liquid hazardous wastes should be stored in closed-top drums with bung type or open top lids depending on the nature of the waste. The drums should have the bungs turned in tight at all times except when hazardous wastes are being emptied or added. Liquids should always be added using a non-sparking funnel to prevent spillage and potential combustion. Funnels and bung wrenches should be constructed of non-sparking material to avoid possible sparking and combustion. Any metal

### Waste Management Plan

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container containing characteristic flammable or ignitable wastes such as solvents, waste gasoline, should be grounded at all times, especially during filling or emptying.

All containers of hazardous waste must be handled carefully to avoid damaging the containers. Stacked containers must be designed for stacking and stable. Full containers should be stored upright to avoid seepage of liquids out of improperly sealed bungs. Empty damaged containers should be removed from service immediately and labelled as damaged to avoid future use. Damaged containers full of hazardous waste should be reported immediately to the supervisor in charge of the area and to the Environmental Department.

Medical wastes must be stored in covered and or locked cans or bins marked as “medical or infectious wastes” and stored securely to prevent access by unauthorized personnel. Medical wastes storage should be minimized to the extent possible. Medical wastes should be disposed by incineration as soon as possible.

Containers holding incompatible hazardous wastes shall be separated both in the work areas and in the Hazardous waste facility by physical barriers sufficient to prevent mixing of chemicals.

#### 9.2.2 Labelling

All waste containers must be marked with a label indicating the contents and waste code if applicable.

Containers of unknown waste or other materials that have not been characterized will be marked with a drum or container label indicating the contents are unknown and under review.

#### 9.2.3 Waste facility Inspections

Inspections of all Waste Facilities shall be conducted as per site inspection schedule. Inspection forms will include at a minimum prompts that require the inspector to look for appropriate labelling, any leaks or seepage, or deterioration or damage to the container. Each work area is responsible for inspecting and maintaining their waste facilities.

#### 9.2.4 Incompatible or Reactive Wastes

Incompatible wastes should never be stored in contact with each other or in the same containers, either in the field or in the Hazardous Waste Facility. If there is a question about whether wastes are incompatible, contact the Environmental Department before placing the waste in the container. Additional bins will be placed in an area to avoid potentially mixing waste as these needs are identified.

## 10 TRANSPORT REQUIREMENTS

Hazardous wastes will be managed by trained personnel and disposed only in permitted, off-site treatment, storage, and disposal facilities (TSDF), to the extent such a facility can be specified. If required by the TSDF, chemical waste profiles and profile samples will be provided in advance of shipping the hazardous waste. Storage records will be kept. An inspection of the transportation vehicles and receiving facility will be undertaken prior to transport of waste and follow up audits conducted according to the audit schedule.

Wastes will be packaged, labelled, and marked in compliance with applicable regulations. The Environmental Coordinator, or his/her designee, and the transporter will sign the waste delivery form when the waste is being transported offsite (MP-ENV-046-F01 Waste Delivering Report Form). Copies of the tracking form will be made and retained by the Environmental Department; and remaining



### Waste Management Plan

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copies will be given to the transporter. Prior to shipment, all drums will be inspected for proper condition, that all bungs and/or rings are tight, and that all required markings and labels are present. The waste transporter should supply placards; however, appropriate placards for waste shipments will be made available to transporters when needed.

A copy of each waste tracking form will be retained in mine records as chain-of-custody. Copies of all waste analyses or other determinations will be retained in mine records.

A determination of whether a hazardous waste being shipped may be restricted from land disposal will be made prior to shipment. For each shipment of restricted hazardous wastes that do not meet treatment standards, a written notification must be made to the treatment and disposal facility.

The disposal facility must be notified of any underlying hazardous constituents for any waste exhibiting the characteristic of ignitability, corrosively, and / or organic toxicity. All documents related to notifications, certifications, notices or waste analyses must be retained.

## 11 TRAINING

All personnel inducted to Sabajo will complete the general induction which includes basic training and information on waste management. Training records are maintained by the Learning and Development (L&D) team including information of job titles, type and amount of training and attendance record.

Any personnel involved in handling hazardous material including hazardous waste must have specific additional training and must be aware of the Sabajo Spill Response Procedure.

## 12 MONITORING

### 12.1 Environmental Monitoring

Quantities of waste disposed or recycled are documented in the Sabajo Waste Tracking Register in accordance with Table 1 to:

- Determine quantities and types of waste generated by Sabajo activities;
- Allow waste data to be documented in annual reporting; and
- Review performance to promote recycling and reduce waste to landfill.

## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Waste Management Plan

**Table 1 Method of Monitoring Waste Disposal**

Facility/ Contractor	Waste Types	Methodology	Frequency
WRF Landfill	Concrete, Wood, common garbage, food waste, sewage	MP-ENV-046-F02 Waste Facility Receiving Report Form needs to be completed and signed by the dispatcher and deposited at the document box at the Landfill or brought to the Environmental Coordinator- General Services	Weekly
Hazardous waste facility at Merian	Oil, Grease, Coolant, Oily Water	MP-ENV-046-F01 Waste Delivering Report Form needs to be completed and signed by the dispatcher and the receiver at the Off- site Waste disposal facility. Copy of the received form needs to be send to Environmental Coordinator- General Services for transferring it into the Waste Tracking register	As required
Bioremediation Facility	Hydrocarbon affected soil,	MP-ENV-010-F02 Quick Spill Report Form V3.0 - Quick spill report form	As required
Recycling Laydown Area	Aluminum Cans, plastic, paper, Electronic waste	MP-ENV-046-F01 Waste Delivering Report Form needs to be filled out by dispatcher when sending the recyclables to the off-site waste disposal facilities and signed off by the receiver; Copy of the Signed form should be delivered to the Environmental Coordinator – General Services for transferring it in the Waste Tracking register	As required
Scrap metal containers	Scrap Metal, copper,	Weight of the scrap will be tracked in the Waste Tracking Register upon receipt of the nota from Scrap dealer	As required
Haukes / SEMC/ Major	On site waste disposal at the landfill	MP-ENV-046-F02 Waste Facility Receiving Report Form needs to be completed and signed by the dispatcher and given to the Environmental Coordinator- General Services.	As required
Haukes / SEMC/ Major	Off-site waste disposal	The Monthly data collection report needs to be filled out by the contractor for sending waste Off-site. The monthly data collection report needs to be send to Environmental Coordinator- General Services for transferring it into the Waste Tracking register	Monthly

WRF = waste rock facility.

## 13 REPORTING

### 13.1 Internal

- Contractors and employees working at the Project are required to complete a waste delivering form MP-ENV-046-F01 Waste Delivering Report Form each time material is taken to the Landfill;
- Waste monitoring results are supplied to Sabajo as outlined in Table 1 and are entered into the Waste Tracking Register (maintained on the Environmental Department server) and reviewed on a calendar quarterly basis by the Environmental assistant Superintendent.
- Environmental inspections at all work areas are completed monthly; these inspections include criteria related to Waste Management and non-conformances to the criteria are captured in the Inspection Report and corrective actions are entered into Corrective Actions Register for follow up. Incorrect waste disposal is reported as an incident / accident and investigated. Disciplinary action is taken if deemed appropriate to address the root cause of the incident.
- Data Acquisition Workbook to Newmont's Denver Corporate Office.

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## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Waste Management Plan

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- The percentage of waste recovered (recycled or re-used) is included in the monthly Environmental Dashboard.

### 13.2 External

- The Annual Environmental Report summarizes waste management activities and records.
- Newmont Suriname conducts audits of waste disposal and recycling contractors and facilities with use of the MP-ENV-013-F08 Off-Site Waste Disposal Audit Form. This is tracked in the Off-site Audit Schedule & Register; Due diligence audits of off-waste disposal locations and contractors are conducted prior to their first receipt of waste products and annually thereafter. Higher risk facilities may be audited more frequently. An Audit Report is prepared using a standard template, with recommended corrective actions communicated to the contractor. Failure to adhere to standards identified in this Plan may result in termination of agreements to take waste.
- Community concerns related to waste management are managed through the Social Responsibility Department as incidents.

## 14 MANAGEMENT REVIEW

This management plan will be reviewed at least annually or when significant changes to waste management occur at Sabajo.

## 15 REFERENCES

Item	Title	Location
Permit	Environmental and Social Impact Assessment	"Environmental" network drive
Permit	Environmental Design Criteria	"Environmental" network drive
Form	Construction Management Plan Form	"Environmental" network drive
Form	Vegetation Disturbance Permit	"Environmental" network drive
Register	CMP VDP Tracker	"Environmental Share" network drive

## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Waste Management Plan

Reference	Title	Location
Buursink. 2005.	Country Environment Assessment (CEA) – Suriname. Draft Report, February 2005. Inter-American Development Bank.	
IFC (International Finance Corporation). 2007a.	Environmental, Health, and Safety Guidelines for Waste Management Facilities. December 10, 2007.	www.ifc.org
IFC. 2007b.	Environmental, Health, and Safety General Guidelines. April 30, 2007.	www.ifc.org
MP-ENV-013-F08 Off-Site Waste Disposal Audit Form	Off- site waste disposal Audit form	MP-ENV-013-F08 Off-Site Waste Disposal Audit Form.docx
MP-ENV-046-F01 Waste Delivering Report Form	Waste delivery report form	MP-ENV-046-F01 Waste Delivering Report Form.xlsx
MP-ENV-046-F02 Waste Station Receiving Report Form	Waste Station Receiving Report form	MP-ENV-046-F02 Waste Facility Receiving Report Form.xlsx
MS010, Accident Incident Reporting and Investigation- form	Accident & Incident Reporting and Investigation form	04-CINTELLATE - Event Notification Offline Form.pdf
NEM – ENV – S.031	Newmont Environmental Standard – Hydrocarbon Management (2008)	NEM-ENV-S.031 - Hydrocarbon Management v3.pdf
NEM – ENV – S.032	Newmont Environmental Standard – Chemical Management (2008)	ENV-S.032 - Chemical Management v3.pdf
NEM – ENV – S.046	Newmont Environmental Standard – Waste Management (2008)	NEM-ENV-S.046 - Waste Management v3.pdf
PUR-005	Item creations ( stock items)	
PUR-019 Straight PO's	New Product Request Procedure (direct charge)	
SRK Consulting. 2007.	Environmental and Social Impact Assessment of Transport Aspects of the Proposed Bakhuis Bauzite Project, Report No 362387/2a.	
Waste Tracking Register	Waste Tracking register	Waste Tracking Register.xls

# **Appendix 1      Approved Waste Contractors and Locations**

## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Waste Management Plan



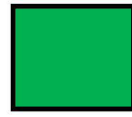




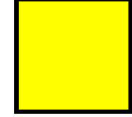



The following vendors and contractors are those approved for use by the Environmental department. These facilities have undergone the due diligence audits and deemed acceptable to Newmont Standards for Waste Management.

Facility Name	Type of waste	Contact person	Contact number	Address	E-mail
<b>AMRECO</b>	<ol style="list-style-type: none"> <li>1. Plastic bottles &amp; aluminum cans</li> <li>2. Plastics (empty engine oil cans; buckets);</li> <li>3. Paper</li> </ol>	Hasnoe/ jimmy	403010 / 8863695 / 8805515/ 8863695	Ramzan Hasnoe weg# 271 zijweg van Martin Luther King weg (voorbij Tout Li Fou)	<a href="mailto:amazonapets@sr.net">amazonapets@sr.net</a>
<b>RE-CYC-OIL</b>	Used Kitchen Oil	Orlando Mahenderpersad	8553222 / 8809882	Roseauweg #6 (New Village-Ringweg)	<a href="mailto:orlando.mah@gmail.com">orlando.mah@gmail.com</a>
<b>SAMMIE'S SCRAP</b>	<ol style="list-style-type: none"> <li>1. Scrap metal,</li> <li>2. drained oil filters,</li> <li>3. nails, empty metal barrels;</li> <li>4. Metal cables, electrical cables</li> </ol>	Anand Jokhoe	8884025	Indiragandhiweg # 276	<a href="mailto:multiopt@hotmail.com">multiopt@hotmail.com</a>
<b>United Construction</b>	<ol style="list-style-type: none"> <li>1. Waste oil;</li> <li>2. Coolant;</li> <li>3. Absorbents &amp; oily rags</li> <li>4. Grease</li> <li>5. Unknown solutions / chemicals</li> </ol>	Deepak Jankie	8952970 / 8812671 / 432701	Garnizoenspad # 58	<a href="mailto:jankieconstruction@hotmail.com">jankieconstruction@hotmail.com</a>
<b>WASPAR</b>	Medical waste		474057		<a href="mailto:stgwaspar@sr.net">stgwaspar@sr.net</a>
<b>BAP waste management</b>	<ol style="list-style-type: none"> <li>1. Electronic waste</li> <li>2. Car batteries</li> <li>3. Household batteries</li> <li>4. Airco's</li> </ol>	Bjorn Pangatjok	8727638	Oud Pad van Wanica weg # 271	<a href="mailto:bjorn.pangatjok@hotmail.com">bjorn.pangatjok@hotmail.com</a>
<b>Suriname Cartridge Depot</b>	Laser printer cartridges - toners	Aristo Kelly	456729	Anton Favereystraat 13, Paramaribo	<a href="mailto:a.kelly@scd.sr">a.kelly@scd.sr</a> <a href="http://www.scd.sr">www.scd.sr</a>
<b>INGAS</b>	Gas (Airco gas, R-134)	Roche hoogeboom	482255	Sir Winston Churchillweg # 247	<a href="mailto:rrogenboom@interfundgroup.com">rrogenboom@interfundgroup.com</a> or <a href="mailto:ingas@interfundgroup.com">ingas@interfundgroup.com</a>
<b>A-Sollutions</b>	<ol style="list-style-type: none"> <li>1. Tires</li> <li>2. Empty barrels</li> </ol>	Amresh Hanoeman	8756263	Bitawiwiristraat # 52	

## **Appendix 2      Waste Segregation by Bin Color and Bin label**



# Waste Segregation by Bin Color and Bin Label

	<p><b>Empty Plastic Bottles &amp; Aluminum Cans</b> (Lege plastic flessen &amp; aluminium blikken)</p>	
	<p><b>General Waste (Huisvuil)</b></p>	
	<p><b>Paper (papier)</b></p>	
	<p><b>Oily Rags &amp; Used Hydrocarbon Absorbents (Poetslappen &amp; Absorbents met olie)</b></p>	
	<p><b>Aerosol cans (Spuitbussen)</b></p>	
	<p><b>Used Batteries, Cartridges (gebruikte batterijen, inktpatronen)</b></p>	

March 2018

# SABAJO PROJECT

## ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

## SPILL PREVENTION, CONTROL AND COUNTERMEASURES PLAN

Report No. 1669326



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Appendix 1: Quick-Spill Report

Appendix 2: Spill Report Form

## Abbreviations and Units of Measure

Abbreviation	Definition
%	percent
>	greater than
ERG	Emergency Response Group
ESMMP	Environmental and Social Management and Monitoring Plan
ESR	Environmental and Social Responsibility
FEL	frontend loader
FMS	Fleet Management System
g	gram
H&S	health and safety
HFO	heavy fuel oil
HSLP	health, safety and loss prevention
IFC	International Finance Corporation
kL	kiloliter
L	liter
MSDS	material safety data sheet
Newmont Suriname	Newmont Suriname, LLC.
PAX	potassium amyl xanthate
Plan	Spill Prevention, Control, and Countermeasures Plan
PPE	personal protective equipment
PVC	polyvinyl chloride
SOP	Standard Operation Procedures
SRT	Site Response Team
SWI	Standard Work Instructions
the Project	the Sabajo Project
TSF	tailing storage facility
TSS	total suspended solids
WRF	waste rock facility

## 1 PURPOSE

The purpose of this Spill Prevention, Control, and Countermeasures Plan (Plan) document is to define methods to prevent spills, document the spill control and response procedures required to respond to spills of materials used by the Sabajo Project (the Project), and ensure appropriate removal and disposal procedures are followed in order to prevent potential impacts to human health or the environment. The Plan also defines training measures to be taken in order to prepare personnel to implement the prevention, control, and countermeasures commitments discussed herein.

## 2 LEGAL AND INTERNAL GUIDELINES

Currently, there are no legal requirements for development of a plan to address potential for spills and associated responses in Suriname. This document is designed to respond to requirements in:

- the International Finance Corporation's (IFC) Environmental Health and Safety Guidelines as listed in:
  - Section 1.5 of the IFC Guidelines, which discuss spillage of hazardous materials, including reactive chemicals and petroleum products;
  - Section 1.6 of the IFC Guidelines, which discusses handling of hazardous waste;
  - Section 3.5 of the IFC Guidelines, which describe requirements related to transport of hazardous materials and the requirement to have mobile response resources in case of spills; and
  - Section 3.7 of the IFC Guidelines which refers to Emergency Preparedness and Response, including requirements for training, identification of resources, key personnel contact lists, and worker and community notification (IFC 2007a).
- the IFC EHS Guidelines for Mining, Section 1.0, (IFC 2007b);
- Newmont Suriname's and Newmont's internal guidelines as defined in:
  - NEM-ENV-S.031 – Hydrocarbon Management v.3;
  - NEM-ENV-S.032 – Chemical Management v.3; and
  - NEM-ENV-S.046 – Waste Management v.3.

This Plan will also reference the International Cyanide Management Code for spill-related guidance related to the transport and use of cyanide. Cyanide handling, transportation, and other management requirements will be dealt with in more detail in the Cyanide Management Plan.

## 3 SCOPE

This procedure applies to all Newmont Suriname employees, contractors and visitors on the Project site, the port, transportation routes, off-site exploration or development properties, or other sites controlled by Newmont Suriname in Suriname.

This procedure is to be used in conjunction with the other subplans included within the Environmental and Social Management and Monitoring Plan (ESMMP).

This Plan will be reviewed and updated annually to ensure that it is inclusive of new materials being introduced to the Project site and to ensure that proper storage, handling and transportation procedures and spill risk analysis is completed and updated.

## 4 OBJECTIVES

The objectives of this procedure are:

- to develop a culture in employees that seeks to prevent spills of materials, recognizing the overall resulting losses to the company, and the potential for impacts to humans and environment;
- to ensure personnel respond correctly and in a timely manner to material spills;
- to identify on-site and otherwise available infrastructure and services required for prevention, control, and response to material spills;
- to describe management and personnel responsibilities for prevention, response and reporting of spills;
- to ensure spilled material is disposed in accordance with guidance described in Section 2, Scope; and
- to ensure environmental harm resulting from spills is minimized to the extent possible.

## 5 SPILL PREVENTION

The following measures will be followed to prevent spills:

- Required training of subcontract truck drivers and training of Project personnel in proper transferring and handling of hazardous and non-hazardous substances;
- Institution of a preventive maintenance program, including inspection schedules, to confirm maintenance of the mechanical integrity and operability of all material transfer and storage infrastructure, including secondary containment systems, automatic shutdowns, and others. This program will include regular inspection of subcontractor transport vehicles;
- Implementation of Standard Operation Procedures (SOPs) and Standard Work Instructions (SWIs) for handling materials, including refueling vehicles, refilling heavy fuel oil (HFO) and Diesel tanks, delivering reagents, and managing secondary containment areas;
- Installation of gauges and overflow protection on fuel and HFO tanks; and
- Ongoing review of all potential pollutants and their characteristics prior to introduction to the Project site and establishment of proper storage, handling and transportation procedures. Spill risk analysis will be conducted in conjunction with procurement personnel and health, safety and loss prevention (HSLP) management. This Plan will be updated as required.

## 6 TRAINING

Training is a key part of this Plan. The training plan will continue to evolve along with the evolution of this Plan as it responds to changes in the Project. Training will include but not be limited to the following items:

All employees and subcontractors will be trained on the following topics:

- Newmont Suriname's commitment to promoting a safe and environmentally responsive work environment at all of the Project facilities, including the Port, transportation routes, and exploration and processing area;
- requirements for first aid training and spill hazard awareness;

### Spill Prevention, Control and Countermeasures Plan

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- key contact personnel, how they can be reached, and what contact protocols are; and
- their rights and responsibilities under this Plan, including the right to shut down work in the case of a serious spill, and how to proceed under those conditions.

Specific to Newmont Suriname employees:

- these personnel will be trained on where chemicals are used at the Project, quantities used, concentrations of chemicals in key areas, where MSDS's can be found, evacuation routes, and how to proceed to deal with a spill prior to arrival of management;
- they will be trained on technical characteristics of the chemicals and processes in their individual work areas, location of spill response kits, and what kinds of PPE are required;
- training will be given on generally how to assess a spill, i.e., what spill scenarios should be considered emergency versus not non-emergency and what is an appropriate response, and the 3 C's (i.e., control, contain and cleanup); and
- what reporting requirements are and how they (employees) are affected.

Contractors will be apprised of their responsibilities:

- contractors working on the Project site will be trained on the same general spill response requirements as Newmont Suriname employees;
- dangerous chemicals will be delivered via convoy or with a pilot car, and only during daylight hours;
- truck drivers will notify their dispatcher, who will in turn notify the Project about departure times arrival times at the Site;
- truck drivers will be trained in emergency spill response specific to the chemical(s) they will be transporting;
- truck drivers will be made aware of expectations relative to speed control, special speed limits in sensitive areas along the transportation routes, location of spill response kits (including in their trucks); and
- truck drivers will be familiar with loading and unloading procedures at the terminal and at the Project. Newmont Suriname employees will be present for unloading at the Project site.



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## 7 RESPONSIBILITIES

Role	Responsibility
<b>All Personnel</b>	<ul style="list-style-type: none"> <li>Clean up all spills and report spills to Supervisors.</li> </ul>
<b>Manager of Services</b>	<ul style="list-style-type: none"> <li>Ensure adequate resources are provided to all Project personnel to provide effective response, removal, and disposal of material spills.</li> </ul>
<b>Departmental Managers</b>	<ul style="list-style-type: none"> <li>Be aware of the requirements of this document applicable to their area of responsibility.</li> <li>Ensure the requirements of this procedure are communicated to all relevant supervisors.</li> <li>Participate in debriefing sessions after spills have occurred in their department. Non-emergency spills will be discussed in weekly / monthly meetings. Emergency spills will be discussed immediately after the Accident/Incident Report is completed.</li> </ul>
<b>HSLP Manager</b>	<ul style="list-style-type: none"> <li>Provide H&amp;S assistance during a spill if necessary.</li> <li>Work in conjunction with the Environmental Superintendent to develop and maintain a responder contact list that includes contact information for all personnel trained in spill response.</li> <li>Participation in preparation of Accident/Incident reports.</li> </ul>
<b>Environmental Superintendent</b>	<ul style="list-style-type: none"> <li>Provide guidance on the handling and disposal of affected material.</li> <li>Determine the Incident Level and required investigation.</li> <li>Assist with incident investigation.</li> <li>Inspect work areas to ensure spills and stains are adequately cleaned up in accordance with requirements and spill kits are fully re-stocked.</li> <li>Permit access to the Bioremediation Facility.</li> <li>Provide training on containment and clean-up of spills to other Department Managers.</li> <li>Review spill report.</li> <li>Participation in preparation of Accident/Incident reports.</li> <li>Participate in debriefing sessions. Non-emergency spills will be discussed in weekly / monthly meetings. Emergency spills will be discussed immediately after the Accident/Incident Report is completed.</li> </ul>
<b>Social Responsibility Superintendent</b>	<ul style="list-style-type: none"> <li>Ensure that liaison with stakeholders near the Project site and adjacent to transportation routes is conducted regularly and effectively.</li> <li>Participate in debriefing sessions. Non-emergency spills will be discussed in weekly / monthly meetings. Emergency spills will be discussed immediately after the Accident/Incident Report is completed.</li> </ul>
<b>Environmental Senior Supervisor</b>	<ul style="list-style-type: none"> <li>Sample soil and groundwater following spills if required.</li> <li>Provide guidance on proper handling of spilled material and cleanup procedures.</li> <li>Inspect the Bioremediation Facility to ensure sufficient capacity, drainage and that only non-synthetic materials are being disposed.</li> <li>Coordinate emergency spill response.</li> <li>Provide advice on environmentally hazardous chemicals.</li> </ul>
<b>Work Area Supervisors</b>	<ul style="list-style-type: none"> <li>Collect information on occurrence of spill and report to appropriate ESR Department.</li> <li>Ensure spill clean-up kits are present in their respective work area and contain sufficient stock to respond to spills in their area.</li> <li>Coordinate investigation of spills and ensure immediate corrective action and clean-up is carried out.</li> </ul>
<b>Warehouse Superintendent</b>	<ul style="list-style-type: none"> <li>Ensure spill kit items as detailed in Section 5.3 are kept in stock in the Warehouse.</li> <li>Manage shipments of oil, fuel, reagents, and other consumables between the Port and suppliers and the Project site.</li> <li>Communication with ESR department and HSLP Manager when new materials are planned for delivery to the Project site.</li> </ul>

the Project = the Sabajo Project; HSLP = health, safety and loss prevention; H&S = health and safety; ESR = Environmental and Social Responsibility.

## 8 DEFINITIONS

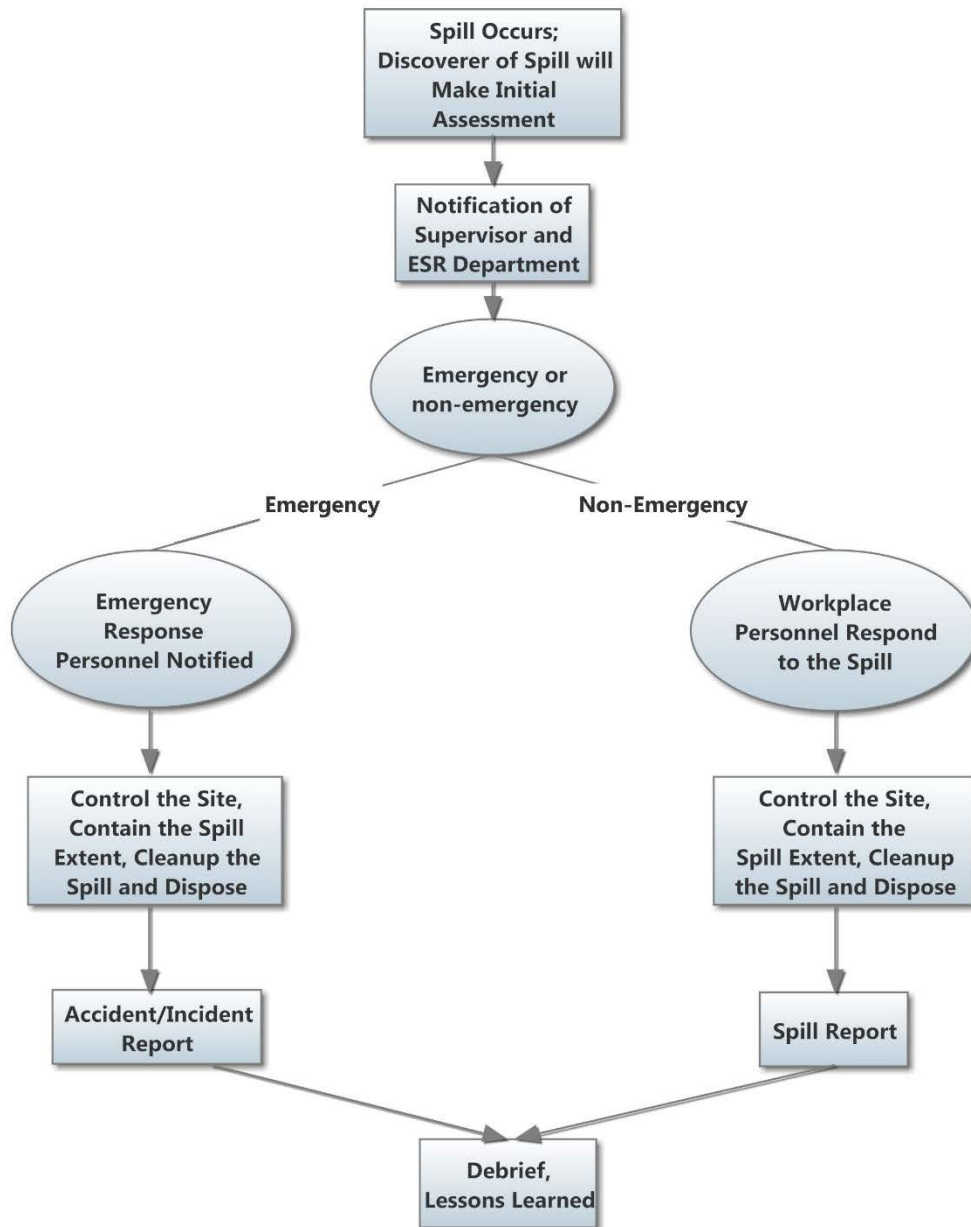
Term	Description
Chemicals	Solvents, cleaning agents, pesticides, flocculants, reagents, caustic soda and other sundry chemicals used for special purposes.
Contact Water	Any surface water that has come into contact with disturbed land, roads, or other work areas at the Project site. Refer to Water Management Plan
Emergency	An unexpected and uncontrolled incident which results in a: <ul style="list-style-type: none"><li>• Human or wildlife hazard</li><li>• Spill entering a drain or stream</li><li>• Leak of bulk storage facilities</li></ul>
Environmentally Hazardous Chemical	Acids, cyanide, PAX, fuel, solvent, oil or other hydrocarbons
Hydrocarbons	Oil, grease, lubricants, diesel, petrol (if necessary), oily water
Oil Dri	Vermiculate based product used for absorption of liquids

PAX = potassium amyl xanthate.

## 9 PROCEDURE

The procedure for responding to a spill is shown in **Figure 1** and described in the proceeding sections.

**Figure 1** Determination of appropriate spill response.



ESR = Environmental and Social Responsibility.

## 9.1 Assessment

Unless the spill is extremely minor in nature, regardless of where a spill occurs on the Project site, at the Port, or on the transportation routes, work shall cease until the hazards can be assessed by a trained individual. **If it is safe to do so**, the person discovering the spill should attempt to identify the source of the spill and stop the flow. Otherwise the spilled material shall be identified to the extent possible and the person discovering the spill shall report it to his/her Workplace Supervisor immediately, who will in turn notify the Environmental Superintendent. If the spill occurs after hours it shall be reported to the Emergency Operator, who will in turn notify the Workplace Supervisor and the Environmental Superintendent or his/her designee.

After management has been notified, the Workplace Supervisor (or person discovering the spill) and management shall verify the type of spilled material and if necessary, consult the correct Material Safety Data Sheet (MSDS) to:

- gain an understanding of the potential hazards involved in exposure and cleanup;
- learn how to properly clean up the material; and
- understand the potential hazards to the environment:

The MSDSs for all chemicals and hydrocarbons can be found on in each of the workplaces on site, in the trip/load data package included with each truckload of reagents, or in the Environmental and Social Responsibility (ESR) Department office.

Once the material is identified, the person discovering the spill and management shall decide if the spill is an emergency. Spills are considered an emergency if there is a **possibility** of:

- human or wildlife hazard;
- the spill entering a drain or stream; or
- leak of bulk storage facilities.

If the spill is considered a serious spill and thus an emergency, management will immediately **call CODE 1, CODE 1, CODE 1 on Radio Channel 2** to notify the internal Emergency Response Group (ERG). The ERG may in turn notify and call out the Site Response Team (SRT) in accordance with the Emergency Response Plan. If necessary, and if the spill is outside the Project site, the Emergency Response Group may choose to notify the Regional Response Team. If there is a mutual aid agreement in place with local agencies, those entities may be contacted as well.

If the spill is not considered an emergency, the personnel in the workplace discovering the spill and Workplace Supervisors shall determine the appropriate PPE as outlined in the appropriate MSDS or in **Table 1** of this Plan. PPE is to be worn at all times while responding to a spill. The workplace personnel in the area of the spill shall then follow the 3C's Principle.

## 9.2 3C's Principle (Control, Contain, Cleanup)

### 9.2.1 Control

Isolate and stop the source of the spill. For example, shut-down machinery, switch off pumps, seal or over-pack the drum, or close valves. Identify the spilled material, if possible. Assess the site and assume control of approaches to the site to ensure that no Project personnel or the public (in the case

of a spill on the transportation route) come into contact with the material. Attend to any injured personnel if necessary.

#### 9.2.2 Contain

Isolate and minimize the spill area and contain the spill by all or some of the following methods:

- create a temporary earth bund using either a shovel or machinery depending on the size of the spill, to prevent the spill from spreading out or entering drainage system(s);
- cover drains and gutters;
- collect liquid materials in buckets made of appropriate material; ongoing leaks in spill trays or empty containers; or
- deploy absorbent socks and/or booms.

To the extent possible minimize the amount of time that the material is in contact with the environment, be it soil, water, or air.

#### 9.2.3 Clean-up and Disposal

Clean-up and disposal varies according to the type of substance spilled as outlined in Table 1. The final locations for the Sabajo Landfill, Temporary Waste Station and the Bioremediation have not been determined. Facility Access to these facilities is restricted and will require authorization from the Environmental Department.

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**Table 1 Appropriate Methods of Cleanup and Disposal for Spilled Materials**

Substance	Clean-up Method	Disposal Location
Hydrocarbons, HFO, #2 Diesel, Oil, other fuels.	<ul style="list-style-type: none"> <li>Use a pump (air diaphragm type or a pump designed for fuel applications) or bucket to recover any free liquid. Pump the recovered liquid into a containment vessel (empty tank, drum or 1000 L pod). Spilled fuel can be pumped directly into secondary containment enclosures (as long as they are designed for fuels) on a temporary basis. <b>Do not pump to workshop sumps.</b></li> <li>Use absorbent products (e.g., peat moss, absorbent mats, booms) or soil to soak up the remaining spill area.</li> <li>It is important to act quickly to minimize time for fuel to absorb into the ground.</li> </ul>	<ul style="list-style-type: none"> <li>Remove all absorbent material and affected soil using a shovel, or loader depending on the size of the spill.</li> <li>For small hydrocarbon spills, store recovered product and affected material (peat moss, soil, etc) in properly labelled drums or Contaminated Soil bins. When these are full, arrange emptying at the Bioremediation Facility. Used synthetic absorbent products such as booms and mats are considered hazardous waste and must be delivered to the Merian Waste Management Facility for disposal off site. (See Waste Management Plan)</li> <li>For large hydrocarbon spills, the affected material shall be taken directly to the Bioremediation Facility via loader or truck.</li> </ul>
Coolant	<ul style="list-style-type: none"> <li>Use a pump or bucket to recover any free liquid. Pump the recovered liquid into a containment vessel (e.g., drum or 1000 L pod).</li> <li>Use absorbent products (e.g., peat moss, chemical absorbent mats) or soil to soak up the remaining spill area.</li> </ul>	<ul style="list-style-type: none"> <li>Recovered liquid coolant containers shall be transferred to the Heavy Vehicle Workshop waste coolant tank.</li> <li>Remove all absorbent material and affected soil using a shovel, bobcat or loader depending on the size of the spill. Dispose at the Merian Waste Management Facility.</li> </ul>
Sewage / Treated Effluent	<ul style="list-style-type: none"> <li>A licensed liquid waste removal company shall pump and remove the sewage and/or liquid effluent.</li> <li>Solid material shall be raked or shoveled up into containers or bags.</li> <li>Contact the ESR Department for guidance regarding necessity for and methods of disinfection.</li> </ul>	<ul style="list-style-type: none"> <li>The licensed liquid waste removal company shall dispose the liquid and solids to the WRF if completed. If the WRF is not operational, recovered sludge and effluent should be trucked to Paramaribo for disposal at a licensed facility</li> </ul>
Contact Water	<ul style="list-style-type: none"> <li>Contact water spills anywhere outside the site-drainage network require reporting due to the potential for erosion to occur and because the total suspended solids (TSS) within water may be greater than the approved discharge level.</li> <li>The ESR Department will assess whether sediment clean-up is required.</li> <li>Contact water spills within the Pit, Plant or RDA limit do not require reporting for environmental purposes.</li> </ul>	<ul style="list-style-type: none"> <li>Seek Environmental Department advice.</li> </ul>

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### Spill Prevention, Control and Countermeasures Plan

**Table 1 Appropriate Methods of Cleanup and Disposal for Spilled Materials**

Substance	Clean-up Method	Disposal Location
Cyanide	<ul style="list-style-type: none"> <li>All cyanide spills shall be cleaned-up immediately and the affected area remediated within 72 hrs.</li> <li>Any spill of cyanide (except small quantities within the Metallurgical Laboratory) are classified as <b>SERIOUS</b> as defined in the Emergency Response Plan. (Some leakage of cyanide-containing solution from pump glands and small releases in the processing area are also normal and not considered spills (as long as they are within secondary containment).</li> <li>Following control and containment of a cyanide solution spill outside secondary containment, apply Soda Ash (Sodium Bicarbonate) over the surface of the solution. Soda Ash is included in the cyanide cleanup kits.</li> <li>Using visual assessment, remove soil which appears to be affected.</li> <li>In conjunction with the ESR Department, confirm that all affected soil has been removed. This is to be achieved by sampling remaining soil for cyanide contamination using the applicable SOP, „<i>Sampling for Cyanide Spills</i>. Following completion of the recovery exercise, the ESR Department may test groundwater in the vicinity of the spill area for cyanide contamination.</li> <li>Replace removed soil with fresh soil if necessary.</li> </ul> <p><b>Neutralization</b></p> <ul style="list-style-type: none"> <li>Ferrous Sulfate, Sodium Hypochlorite or Hydrogen Peroxide shall <b>not be used</b> near a natural surface water system or where the solution may enter a surface water system.</li> <li><b>Neutralization shall be considered as last resort.</b> Before using any neutralizing agents the ESR Department shall be consulted.</li> <li>The pH of any area to be neutralized shall be greater than pH 9. Apply Soda Ash if necessary to raise the pH.</li> <li>Apply and mix Ferrous Sulfate (stored at Merian Waste Station and in the warehouse) at the ratio of 400g per 1 liter of 30% weight cyanide solution. (This is equivalent to 7 tonnes per 18kL isotainer of solution). The Ferrous Sulfate and cyanide will form a “Prussian” blue color when reacting to form cyanate. This will solidify and can then be removed.</li> <li>In conjunction with the ESR Department, conduct test work to verify that the cyanide has been neutralized.</li> </ul>	<ul style="list-style-type: none"> <li>Thoroughly wash all PVC and rubber PPE, shovels, FEL bucket, tires etc. with process water initially, then rinse with fresh water. Following completion of the recovery operation and removal of wet weather PPE, the disposable overalls shall be burned with the persons burning standing upwind.</li> <li>In conjunction with the Environmental Department, determine whether the soil in the spill area that has been neutralized needs to be removed to the TSF.</li> </ul>
Other Chemicals / Reagents	<ul style="list-style-type: none"> <li>Consult MSDS for appropriate clean-up method.</li> <li>A general rule for most chemical clean-ups is to apply lime to neutralize the solution.</li> </ul>	<ul style="list-style-type: none"> <li>Cleaned up material and affected soil shall be disposed in the TSF if the spilled reagent is water based and pH neutralized.</li> <li>Cleaned up material and affected soil shall be disposed in the bioremediation Affected soil</li> </ul>

HFO = heavy fuel oil; ESR = Environmental and Social Responsibility; WRF = waste rock facility; MSDS = material safety data sheet; TSF = tailing storage facility; FEL = frontend loader; PVC = polyvinyl chloride; L = liter; kL = kiloliter; g = gram.

### 9.3 Spill Clean-up Kits

All work areas and specific vehicles shall have a number of sufficiently sized spill clean-up kits available for use. Kits shall be fully re-stocked after use. Work place personnel are responsible for reporting depleted supplies in the spill kits, but the Environmental Coordinator – Mine Operations shall regularly inspect all spill kits (both non-mobile and mobile types) for depletion and require supervisors to take responsibility for kits in their area.

Non-mobile clean-up kits must be kept in all work places on site, including at the processing area, workshops, chemical and fuel storage areas and fueling bays, crushing buildings, warehouse, and in the administration building. The kits are available as stock items at the Warehouse. These kits contain:

- Level D personal protective equipment (PPE; with the exception of hardhats, and steel toed shoes);
- drums and buckets, shovels;
- Oil Dri;
- mini booms; and
- absorbent mats and booms.

Mobile clean-up kits are to be kept on drill rigs, service and fuel trucks (for equipment fueling), fuel delivery tractor-trailers, ESR Department vehicles, and HSLP Department vehicles. These kits are available in the warehouse as stock items and shall consist of two (2) sealed 5-gallon buckets, containing:

- Level D PPE (with the exception of hardhats, and steel toed shoes);
- a collapsible shovel that will fit in one of the buckets;
- Oil Dri; and
- absorbent mats and booms.

### 9.4 Reporting

#### 9.4.1 Internal Reporting

All spills must be reported to the Work Area Supervisor, regardless of size. The Work Area Supervisor shall determine the level of reporting required as outlined in Table 2.

**Table 2 Spill Reporting**

	Work Area Supervisor	ESR Department (Environmental Superintendent or his designee)	HSLP Department	Quickspill Card	Accident/ Incident Report
Minor (Non-routine) Spills within Bunded Area	✓			✓	
Spills Outside Bunded Area	✓	✓	If Required	✓	If Required
Major spills and Emergencies	✓	✓	✓	✓	✓

\*Minor spills result from incidents such as burst hoses and small leaks and occur within bunded areas.

ESR = Environmental and Social Responsibility; HSLP = health, safety and loss prevention.



Spills within impervious (concrete or synthetic) secondary containment do not require reporting to the ESR department. This type of spill should be reported to the Work Area Supervisor as they could be indicative of a maintenance problem and could become operationally or environmentally problematic.

Minor (Non-emergency) spills can be reported using the Quickspill Card only (Appendix 1). This report shall be completed for environmentally hazardous chemical spills (e.g., hydraulic oil, diesel, coolant) resulting from burst hoses and minor leaks. Forward completed forms to the work area supervisor who will forward to the ESR Department by the end of shift for incident reporting. These types of spills can result in generation of a Debrief report.

Any spills outside a bunded area require a similar method of reporting to minor spills except that the spill will immediately be reported to and assessed by the ESR Department, which will determine if the HSLP department should be notified and whether an Accident/Incident Report is required. This decision will be based on the maximum potential consequence of the spill, whether there are any required preventative actions prescribed, and whether or not the problem is chronic. A Debrief report is usually required in this case.

Emergency spills (as defined in Section 6.1) can result in major environmental damage. These situations usually involve hazardous or toxic materials and occur outside of bunded areas, often near environmentally sensitive receptors and in population areas. Emergency spills are considered major spills and an Accident/Incident Report will be filed for review by the Operations Management Team along with a debrief, lessons learned review. In addition to other requirements the Operations Management Team meets to discuss a wide range of environmental issues and is comprised of all Department Managers and other key management personnel if and as required by individual circumstances. A Debrief report is always required in this case.

#### 9.4.2 External Reporting

The Project is not currently required to report spills under Surinamese law. Newmont Suriname will report spills to its corporate entities under annual environmental reporting requirements.

### 9.5 Debrief / Lessons Learned

After a spill has been cleaned up, spilled materials disposed and reporting completed, a debriefing session is required. Debriefing sessions must examine the following factors relating to any spill:

- Environmental factors at the time of the spill, i.e., weather, or time of day;
- Human factors, i.e., was there human error involved? If so, what was the cause? Lack of training, other issues?
- Equipment factors, i.e., was there a failure of spill prevention components or operational equipment?
- Procedural factors, i.e., is there a problem with the procedures? Is a new SOP required?
- Was the notification procedure adequate?
- Was the efficiency of the clean-up adequate?
- What could be done better? What are the lessons learned? How can we avoid a repeat of this incident?

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Each spill will be reviewed from the standpoints of Health and Safety, environmental impact, and impact on the community based on the descriptions in Table 3 and will be assigned a numerical level, rating, and estimated cost and will be recorded by the ESR department. Tracking the severity of the impacts resulting from spills based on these parameters will enable management to track type and seriousness of the spills that are occurring as well as costs, which will in turn enable management to discern and react to trends.

Non-emergency spills will be discussed as a part of management staff meetings once per week or once per month. Emergency spills will be discussed within one to two days after finalization of cleanup and reporting. Personnel required at all debriefs will include the Environmental Superintendent and the Management of the Department where the spill occurred. The HSLP Manager will be required to attend if the spill was an emergency.

**Table 3 Risk / Consequence Matrix**

Level	Rating	Estimated Cost	Health & Safety	Environmental	Community
1	Insignificant	>\$1,000	First Aid injury Nuisance Value	No or very low environmental impact Impact confined to small areas	Isolated complaint No media inquiry
2	Minor	>\$10,000	Medical Treatment Injury Restricted Work Injury	Low environmental impact Rapid cleanup by site staff and/or contractors Impact contained to area currently impacted by operations	Small numbers of sporadic complaints Local media inquiries
3	Moderate	>\$100,000	Single Lost Time Injury First Aid injury to community member	Moderate environmental impact Cleanup by site staff and/or contractors Impact confined within lease boundary	Serious rate of complaints, repeated complaints from the same area (clustering) Increased local media interest
4	Major	>\$1,000,000	Multiple Lost Time Injuries Admission to intensive care unit or equivalent Serious, chronic, long-term effects Medical treatment injury to community member	Major environmental impact Considerable cleanup effort required by site and external resources Impact may extend beyond the lease boundary	Increased rate of complaints, repeated complaints from the same area (clustering) Increased local/national media interest
5	Catastrophic	>\$10,000,000	Fatality(s) or permanent disability Multiple medical treatment injuries, a single disability, or a fatality to community member	Severe environmental impact Local species destruction and likely long recovery period Extensive clean up involving external resources Impact on a regional scale	High level of concern or interest from local community National and/or international media interest

> = greater than; \$ = USD.

## 10 REFERENCES / ASSOCIATED DOCUMENTS

This Plan is designed to be used in reference with other documents. If questions arise relative to interpretation of the requirements contained herein, these associated documents may prove helpful.

The NEM-ENV-S.XXX documents are Newmont Suriname / Newmont internal guidance that can be referred to if there are questions regarding internal guidance. The documents referenced as “ESMMP” below are included as annexes to the ESMMP document and are readily available for review. Between this plan and the ESMMP subplans listed below, no gaps should exist in the overall approach to this topic.

Reference	Title
ESMMP	Waste Management Plan
ESMMP	Emergency Response Plan
IFC (International Finance Corporation). 2007a.	Environmental, Health, and Safety General Guidelines. April 30, 2007.
IFC. 2007b.	Environmental, Health, and Safety Guidelines for Mining. December 10, 2007.
NEM-ENV-S.031	Newmont Environmental Standard – Hydrocarbon Management (2014)
NEM-ENV-S.032	Newmont Environmental Standard – Chemical Management (2008)
NEM-ENV-S.033	Newmont Environmental Standard – Cyanide Management (2008)
NEM-ENV-S.046	Newmont Environmental Standard – Waste Management (2008)

## 11 DOCUMENT CONTROL

### 11.1 Revision History

Rev.	Author	Change	Date
0.0	Newmont Suriname.	Document Created	

# **Appendix 1: Quick-Spill Report**

**Sabajo Gold Mine**

**Quick-Spill Report**

Date\_\_\_\_\_Shift\_\_\_\_\_Time\_\_\_\_\_

Discovered by (optional)\_\_\_\_\_

Reported to:\_\_\_\_\_

Type of material Spilled\_\_\_\_\_

Location\_\_\_\_\_

Source of spill (cause)\_\_\_\_\_

Estimated volume spilled\_\_\_\_\_

Spill contained by\_\_\_\_\_

Cleanup started by using (circle one)

Pads Booms Oil Dri Soil Other\_\_\_\_\_

**Supervisors Report**

Time Reported to ESR Dept.\_\_\_\_\_

Cleanup material:

Volume used\_\_\_\_\_

Where disposed\_\_\_\_\_

Signature\_\_\_\_\_

## **Appendix 2: Spill Report Form**

**Sabajo Gold Mine**

**Spill Report**

Date \_\_\_\_\_ Shift \_\_\_\_\_ Time \_\_\_\_\_

Discovered by (optional) \_\_\_\_\_

Reported to: \_\_\_\_\_

Type of material Spilled \_\_\_\_\_

Location \_\_\_\_\_

Source of spill (cause) \_\_\_\_\_

Estimated volume spilled \_\_\_\_\_

Spill contained by \_\_\_\_\_

Cleanup started by using (circle one)

Pads Booms Oil Dri soil other \_\_\_\_\_

\_\_\_\_\_

**Supervisors Report**

Time Reported to ESR

Dept. \_\_\_\_\_

Cleanup material:

Volume used \_\_\_\_\_

Where disposed \_\_\_\_\_

Signature \_\_\_\_\_

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March 2018

# SABAJO PROJECT

# ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

# CLOSURE AND RECLAMATION PLAN

Report No. 1669326





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## **Abbreviations and Units of Measure**

<b>Abbreviation</b>	<b>Definition</b>
ASM	artisanal and small-scale mining
CRP	Closure and Reclamation Plan
ELA	Environmental Liability Assessment
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management & Monitoring Plan
GoS	Government of Suriname
ha	hectares
ICMM	International Council on Mining and Minerals
IFC	International Finance Corporation
SOC	Species of Concern
WRF	waste rock facility

## 1 PURPOSE

This Closure and Reclamation Plan (CRP) has been developed to implement the closure-related commitments made in the Sabajo Project (the Project) Environmental and Social Impact Assessment (ESIA), and other Environmental and Social Management & Monitoring Plans (ESMMPs), as well as the Newmont Environmental Standard for Closure and Reclamation Planning. This CRP will also address closure guidance issued by the International Finance Corporation (IFC) in their Performance Standards and in the Environmental, Health and Safety Guidelines for Mining. It is anticipated that the CRP will require periodic revisions and updates as the Project progresses through different mine-life stages, and during implementation, as results are reviewed and improvements identified.

## 2 SCOPE

This CRP applies to operations, closure and post-closure activities, and describes actions designed to mitigate the potential physical, biological, and social impacts of construction and operations and closure of the Project. Closure is defined as the process followed when a mine operation has reached the stage in its lifecycle where the intended mining use has been permanently concluded. Closure activities include those decommissioning and reclamation actions required to return the site as much as possible to pre-mine conditions, and community consultation activities relating to cessation of operations<sup>1</sup>. Reclamation is considered to be the return of disturbed land to a stable, self-sustaining condition compatible with future land use objectives<sup>1</sup>. The closure phase will be followed by post-closure. The post-closure section describes required monitoring and other activities necessary to ensure that the site can be left in an unmaintained but sustainable state.

The CRP is linked to several other management plans, including:

- Waste Rock Management Plan (in development);
- Water Management Plan (in development);
- Biodiversity Plan (in development);
- Health & Safety Plan (from Merian);
- Artisanal and Small Scale Mining (ASM) Management Plan (in development); and
- Spill Prevention and Countermeasures Plan for hydrocarbons and chemicals.

This version of the CRP is conceptual in nature and as such it will communicate very general outcomes and goals. As the Project goes into operation, successive versions of this CRP will include milestones, more detailed methodologies for achieving these milestones, as well as additional details surrounding monitoring and validation processes. Newmont Suriname will develop another version of this CRP as the construction phase is ending and initial operations are begun. That version of the CRP will provide additional detail on the following items:

- establish the ongoing review and update process for the successive closure plan revisions;
- further clarify objectives, targets, and monitoring requirements;
- update the closure cost estimate; and

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<sup>1</sup> Adapted from NEM-ENV S.200 (Glossary Environmental Standards V2.1)

- identify potential community uses of infrastructure after decommissioning and relinquishment.

### 3 OBJECTIVES AND GUIDANCE

Closure and reclamation of the Project will be based on the following general objectives:

- Reclamation goals and objectives will be considered during design and planning of construction and operations.
- Progressive (concurrent) reclamation will be implemented where it is possible and timely. Reclamation test plots will be established, monitored and tested to optimize reclamation techniques and procedures.
- The closure and reclamation design will ensure that long-term physical and chemical stability is achieved.
- The long-term goal of reclamation is to return the site to a forested habitat consistent with the surrounding forest, to the extent possible.
- Consultation will be conducted with local communities and resulting input will be incorporated into reclamation planning.
- The closure and reclamation process will provide opportunities for social development in the post-mine condition.
- Closure activities aim to return the site, to the extent possible, to current conditions with the exception of improvements to the areas currently impacted by ASM.

These general objectives were prepared to incorporate the commitments and requirements included in the following sections.

#### 3.1 Environmental and Social Impact Assessment Commitments & Other Requirements

Section 6 of the Sabajo Draft ESIA (March 2018) contains a Table of Commitments that summarizes the Project commitments made during the permitting and public disclosure process, including those related to closure and reclamation. Specific commitments in the table are listed below:

- General objectives for reclamation and closure of the mine site will include:
  - Industry good practice reclamation goals will be identified during design and planning of operations.
  - The reclamation and closure will be designed to ensure protection of long-term physical and chemical stability at the site.
  - Progressive reclamation will be implemented where possible.
  - The long term reclamation goal is to return the site to a forested habitat consistent with surrounding forest. Replanting of vegetation Species of Concern (SOC) will improve vegetative species diversity and improve wildlife habitat condition.
- As part of the community consultation program, local communities will be asked for input into the implementation of site closure. In general terms, this may include input to specific land uses, continued employment opportunities, important plant species and target wildlife habitat types. Newmont Suriname will take steps to involve the local community in closure and reclamation

### Closure and Reclamation Plan

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activities which may include: woody debris handling, seed collection, establishment of a propagation nursery, erosion control, and adaptive reuse of some buildings and facilities.

- Growth media (topsoil veneer along with underlying saprolite) will be salvaged where possible and used for concurrent reclamation sites nearby to a new disturbance. A growth media balance will be prepared to ensure salvage of sufficient material to complete closure activities. Post-mine reclamation will also utilize stockpiled saprolite from one of the waste rock facilities.
- Waste rock management will include proper sequencing to assure the availability of adequate saprolite for concurrent reclamation throughout the life of the Project. Vegetation will be established immediately after placement of stockpiled saprolite to prevent erosion and to begin soil rehabilitation as soon as possible.
- Field monitoring will be conducted in conjunction with concurrent reclamation activities to review and optimize reclamation technologies and techniques.
- Disturbed areas will be re-vegetated as part of mine closure (with the exception of the pits).
- Live vegetative material will be transferred from newly disturbed sites to areas that are ready for closure, as opposed to clearing and disposal of mature vegetation.
- Progressive (concurrent) reclamation will take place during construction, operation and closure. Locations identified for progressive reclamation activities will be updated annually, along with reclamation timelines.
- Wildlife habitat compatible with similar areas in the surrounding landscape will be established. This habitat will be achieved through recontouring disturbances to blend with the surrounding environment, re-establishing functional hydrology and re-vegetating to locally common, tropical forest species. Native tree species will be planted on reclaimed areas along with other locally common vegetation species that are typical to the surrounding ecosystem.
- Building and structures related to the Project will be decommissioned and removed from the Project area prior to reclamation. Consideration will be given to retaining certain facilities that may be of ongoing benefit to local residents.
- Remediation activities in contaminated areas will be completed following appropriate guidelines and procedures in place at the time of decommissioning.
- Precipitation and groundwater will flow into the open pits upon closure, creating pit lakes. Berms with signage will be placed around the perimeter of the pit.
- At closure, Waste Rock Facilities (WRF) will be re-contoured to resemble surrounding landforms; the slopes will be stabilized and revegetated. Water treatment of the WRF seepage may be necessary in the long term
- Other infrastructure footprints at the site including the access and haul roads, laydown areas, and camps will have compacted soil deep-ripped to enhance percolation. Natural contours will be re-established to the extent possible revegetation will commence immediately.
- Long-term monitoring of at least the following parameters on all reclaimed areas will be implemented after completion of closure and reclamation activities:
  - surface water and groundwater quality monitoring, some limited air quality monitoring as necessary;
  - relative success of erosion control actions;

### Closure and Reclamation Plan

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- vegetation establishment success, including parameters indicating vegetation health, growth, diversity, comparability of reclaimed communities versus natural analogues; and
- wildlife usage of reclaimed sites.

Findings will be used to adapt reclamation strategies if necessary, apply mitigations when necessary, and determine when monitoring can be discontinued.

### 3.2 Newmont Requirements

Newmont has policies in place to promote sustainability and help direct their global activities in health and safety, community relations, and environmental responsibility. These policies ensure that the properties are continuously improving their performance and tracking their progress to meet objectives that have set in each area. Newmont policy states that:

“Each Newmont operation will develop, during the design phase, and implement during operations and closure, a closure and reclamation plan that provides for long-term environmental stability and suitable post-mining beneficial land uses.”

In addition to the policy, there are closure requirements in several of the Newmont standards, which are discussed here. The Newmont Standard on Closure and Reclamation Planning (NEM-ENV-S.096) is focused on physical reclamation and does not include requirements for social closure planning. There is a requirement in Newmont’s guidance for Social Impact Assessment (NEM-SR-S.02) that requires social impact assessment updates be conducted during all phases of the Project, including during planning stages, every five years during operations, and three years prior to decommissioning (with a closure focus). Newmont Suriname believes that social planning is an important component of the closure process. In addition to NEM-ENV-S.096, other internal Newmont guidance that discusses closure and reclamation topics applicable to the Project can be found in:

- NEM-ENV S.042 Waste Rock Management;
- NEM-ENV-S031 Hydrocarbon Management; and
- NEM-ENV-S.032 Chemical Management.

### 3.3 International Standards

The IFC Environmental, Health, and Safety Guidelines (2007) guidance on mine closure and post-closure addresses the need to include both physical and socio-economic considerations into a closure plan to order to ensure that:

- future public health and safety are not compromised;
- the post-mining use of the site is beneficial and sustainable to the affected communities in the long term; and
- adverse socio-economic impacts are minimized and socio-economic benefits are maximized.

The IFC also recommends that closure planning address beneficial future land use, which should be determined using a multi-stakeholder process that includes regulatory agencies, local communities, traditional land users, adjacent leaseholders, civil society and other impacted parties. The guidance goes on to state that the closure plan be previously approved by the relevant national authorities, and be the result of consultation and dialogue with local communities and their government representatives.

### Closure and Reclamation Plan

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According to the International Council on Mining and Minerals (ICMM), closure planning is a process that extends over the mine life cycle and typically culminates in tenement relinquishment. It includes decommissioning and rehabilitation (reclamation). The term closure alone is sometimes used to indicate the point at which operations cease, infrastructure is removed and management of the site is largely limited to monitoring. Planning for closure means that the mine was designed to facilitate closure and leave behind an enduring positive legacy. Health, safety, social, environmental, legal, governance and human resource considerations in the community are addressed from exploration through to post closure.

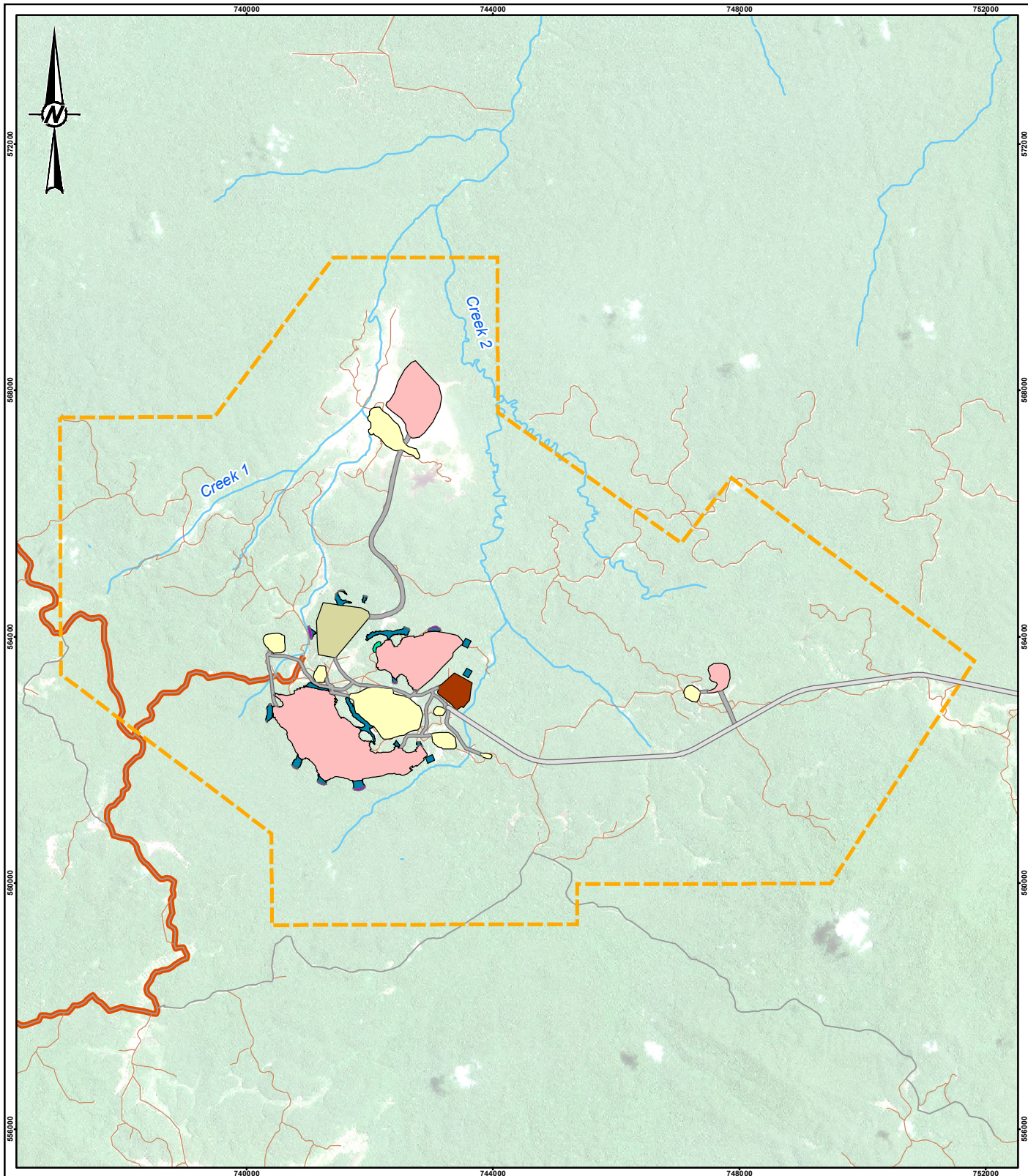
ICMM believes that positive outcomes of effective closure planning should mean that:

- Engagement with affected and interested parties will be consistent and transparent.
- Communities will participate in planning and implementing actions that underpin successful closure.
- Closure decisions will be better supported by stakeholders.
- Planning for closure will become easier to manage.
- The accuracy of closure cost estimates will be improved.
- The risk of regulatory non-compliance will be minimized.
- Potential problems will be identified in a timely manner.
- There is more likely to be adequate funding for closure.
- Potential liabilities will be progressively reduced.
- Opportunities for lasting benefits will be recognized and planned for adequately.

## 4 BACKGROUND

The Project is located in the northeastern part of Suriname, approximately 100 kilometers (km) south of Paramaribo and can be accessed by either the Afobaka Road or the Carolina Road (Figure 1). The Project site is located in the Commewijne watershed in a largely undeveloped part of Suriname. The nearest community, approximately 37 km southwest the Project site by road, occurs at Afobaka Centrum, an administrative and business centre with a population of less than 300 people. The area immediately surrounding the Project has been modified to a significant degree by timber cutting and artisanal and small scale mining (ASM).



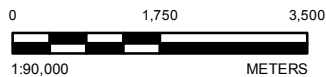


**LEGEND**

- ROAD
- LOCAL ROAD
- WATERCOURSE
- WATERBODY
- POTENTIAL PROJECT ACCESS ROAD
- EXPLOITATION CONCESSION BOUNDARY

**PROJECT FOOTPRINT**

- PIT
- STOCKPILE
- WASTE ROCK STORAGE FACILITY
- SURFACE FACILITIES
- LANDFILL
- ROAD
- MERIAN TRANSPORT CORRIDOR
- WATER MANAGEMENT BERM
- WATER MANAGEMENT POND



**REFERENCE(S)**

BASE DATA AND TOPOGRAPHY PROVIDED BY NEWMONT. IMAGERY OBTAINED FROM COPERNICUS SENTINEL DATA AUGUST 23, 2017.  
 DATUM: WGS84 PROJECTION: UTM ZONE 21

CLIENT  
**NEWMONT SURINAME**

PROJECT  
**SABAJO PROJECT ESIA**

TITLE  
**MAJOR FACILITIES AT SABAJO**

CONSULTANT



YYYY-MM-DD 2018-03-01

DESIGNED GJ

PREPARED BDW

REVIEWED GJ

APPROVED GJ

PROJECT NO. CONTROL  
**1669326**

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FIGURE **1**

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## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Closure and Reclamation Plan

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As reported in the ESIA, the proposed Project consists of development of a gold mine with possible production of approximately 613,000 ounces (oz) of gold over a planned mine life of 10 years. This estimate includes removing 140 million tonnes of waste rock. Exploration at the site is ongoing and will continue during operations; as such actual anticipated gold production totals will be refined over time. There is potential that additional deposits may be identified over the course of the mine life, but the scope of this CRP is limited to the currently known resource, estimates as presented in the ESIA, and the Project Area as shown in Figure 1.

The construction and operation of the Project requires the development of supporting infrastructure and construction of mine facilities. Table 1 below presents the main mine components that will be constructed and associated hectares of disturbance by component.

**Table 1 Summary of Total Disturbed Area by Major Mine Component**

Mine Component	Total Disturbed Area (approximate hectares)
Pits	126
Waste Rock Disposal areas (WRF)	343
Accommodations Camp / staging areas	53
Haul roads (other than Sabajo-Merian Haul Road)	67
Ore stockpile	21
Water management structures (Ponds, berms)	55
Sabajo-Merian Haul Road	221
<b>Total hectares</b>	<b>886</b>
Buffer for fly rock (500m contingency around pits)	665
<b>Total hectares</b>	<b>1,551</b>

The mine life has been divided into four phases: Construction, Operations, Closure and Post-closure. Pre-production includes all activities required to build the mine and associated facilities. Operations is the phase during which the mine is producing and transporting ore for processing at Merian Mill. Closure describes the phase after production during which Newmont Suriname will stabilize the site so that it can be left in a sustainable state over the long-term. Post-closure is the phase during which Newmont Suriname will be monitoring the efficacy of the site stabilization activities and other closure actions to determine if the Site has stabilized and there is no longer a need for maintenance and management of the Site.

Generally, closure activities will include:

- regrading of waste rock disposal area and re-vegetation;
- pit lake management if necessary;
- any required site grading to ensure long-term site drainage conditions;
- stabilization of all slopes through re-grading and re-vegetation;
- establishment of a long-term water management system if necessary; and
- inception of post-closure environmental monitoring.



## **5 BASELINE INFORMATION**

Currently, small-scale mining is the largest source of land disturbance in the area. Locally the current gold rush began in 1993 and presently is estimated to employ 200 people. The basic method used is placer mining, and is often conducted with large equipment such as excavators and high-pressure pumps. This activity, which had been focused in the creek bottoms near the Project site, was expanded to nearby, up-gradient locations which resulted in large-scale hydrological and land surface disturbances. In recognition of the extensive land disturbance resulting from small-scale mining in the concession area, Newmont Suriname started sampling surface water and sediment in 2010, and did an inventory of land disturbance in 2014. Since that time, Newmont Suriname has continued to monitor and update the disturbance from ASM activities. The current estimate of total disturbance from ASM activities is more than 400 hectares (ha) within the concession area.

As part of the development of the ESIA, it was determined that the only settlements within the areas defined by the proposed Right of Exploitation are transient small-scale mining camps. There are several temporary settlements functioning as ASM camps in proximity to the Project facilities, as verified by a small-scale mining study and an Environmental Liability Assessment (ELA), both carried out in 2017. According to the ESIA, the Project does not involve the magnitude of direct socio-economic effects characteristic of large mining projects. ASM is a key livelihood activity around the Project Site, and the illegal artisanal and small scale miners (ASM miners) typically move frequently and establish small exploitation camps wherever they go.

## **6 PRELIMINARY CLOSURE AND RECLAMATION PLAN**

### **6.1 Facility-Specific Physical Closure And Reclamation**

The Project footprint is approximately 886 ha including mine pits, WRFs, camp facilities, haul roads, and other facilities (access roads, stockpiles, laydown areas, drainage works and sedimentation ponds).

#### **6.1.1 Mine Pits**

Eight mine pits will be developed over the Project life; Cassador, Pits 2-6, Santa Barbara and Margo. At closure, the pits are expected to extend from approximately 40m to approximately 290 m below the surface and span an estimated 126 ha. The final closure design for the pits will be determined based on what can be technically and economically supported by the Operational Mine Plan. At closure, water will slowly inundate the pits, mostly as a result of net annual precipitation, creating end pit lakes. The ESIA predicts that the main pit (Cassador) could potentially contain poor water quality. This assessment will be revisited during operations when more information is available regarding pit wall and waste rock water quality is available. In the event that the pit will contain poor water quality, additional mitigation such as quick filling the pit to reduce the exposure of the fresh rock to oxidation, or potentially in-situ water treatment. Fencing and or berms with appropriate signage will be in place, until water levels and water quality have been stabilized.

#### **6.1.2 Non-Production Open Pits, Borrow Areas and Trenches**

All borrow pits used during operations will be closed as soon as they are no longer required. Most will have been closed during operations with Newmont Suriname equipment as part of the progressive rehabilitation strategy. The area will be contoured to match the surrounding topography, hydro seeded and re-vegetated. The contouring will allow for free drainage at a low point to avoid pooling of water.

Trenches for drainage purposes will remain open as they are part of the final surface water management plan.

#### 6.1.3 Sediment Ponds

For closure of the sediment ponds, the perimeter roads will be shaped and contoured to match the surrounding topography. The sediment sludge contained in the sedimentation ponds will be removed when required to maintain capacity. During operations, cleared and grubbed areas no longer required for production will be recontoured and revegetated. Once operations have ceased, reclamation of the areas upgradient of the sediment ponds will be completed, thus stabilizing the soil in the areas above the sedimentation ponds. Once monitoring indicates that the sediment dams are no longer required, they will be reclaimed, including the demolition of concrete outlets and re-shaping and revegetation of earthen berms.

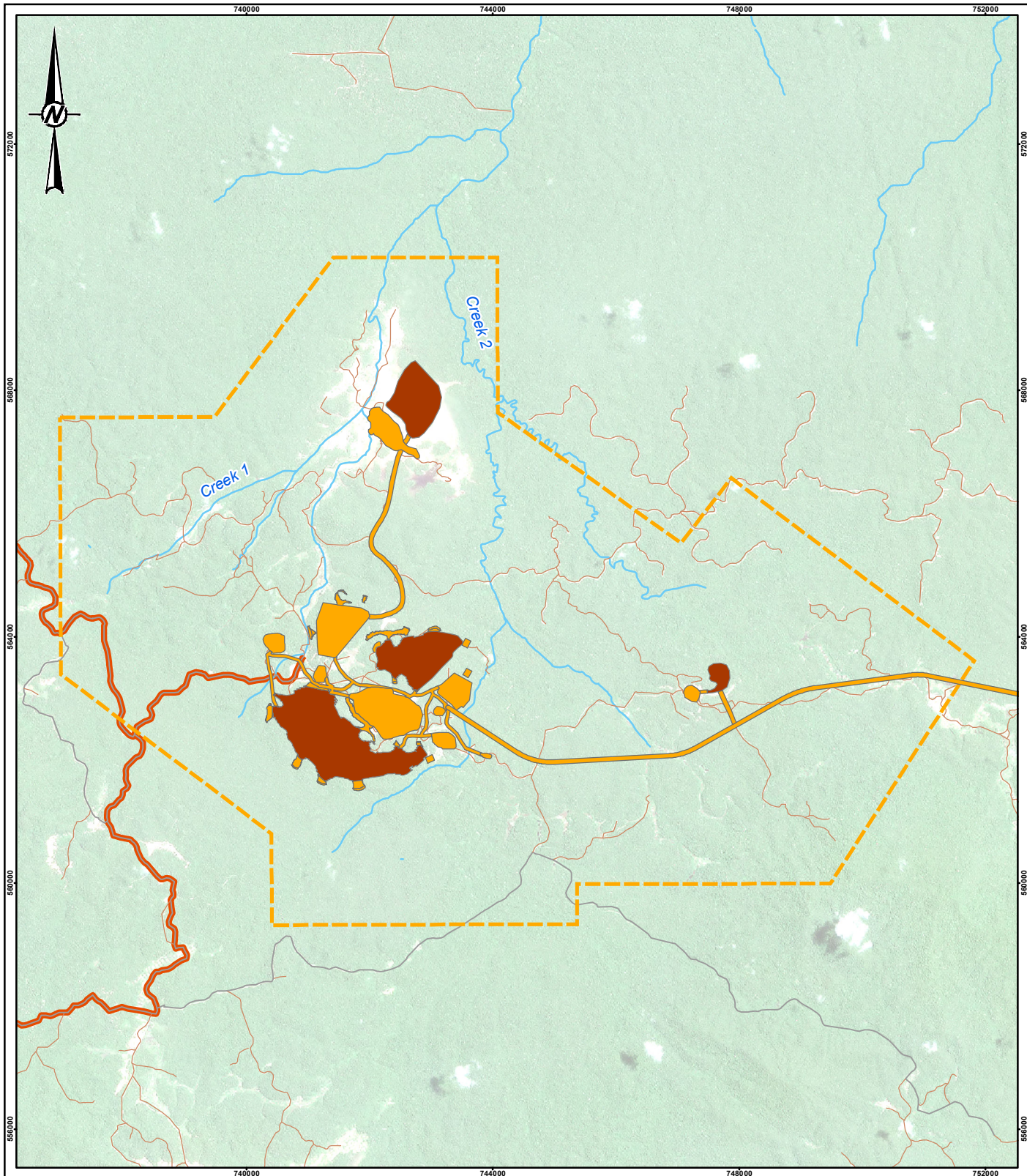
#### 6.1.4 Waste Rock Facilities

A total of 4 waste rock facilities (WRF) are planned during Project operation, occupying an estimated 343 ha. Locations of the WRFs have been selected to minimize truck travel distances from pits to the WRFs (Map 2). The height of individual WRF will not exceed the elevation of regional topography, with expected top elevations from 125 to 150 m above mean sea level.

The WRFs are designed with 10 m lifts with 5 m catch benches to establish an overall slope angle of 2.5H:1V to facilitate rehabilitation work on the dump faces. Once a lift of a dump has been completed, equipment from operations will shape the face of the dump. They will then cap the slope with 1 m of growth media if the exposed face is fresh rock. The face will then be hydro seeded giving native species a chance to grow. This progressive reclamation strategy will minimize sediment runoff during operations (stopping it at the source as much as possible), as well as minimize the closure work that needs to be done after operations.

At the time of closure, the WRFs will be reclaimed by smoothing and recontouring the benches to match surrounding local hills. Once the WRF benches are recontoured, 20 to 100 cm of growth media will be placed over the WRF surface if needed to cover saprock or freshrock. The reclamation material thickness will be adjusted for each WRF to provide an appropriate rooting zone for plants/tree establishment. Slopes will then be stabilized and revegetated according to the final version of this Plan. WRF benches may be left in place where it is unsafe or otherwise not feasible to recontour the slopes, particularly in areas where slopes consist of large aggregate. These WRF benches will be filled in with reclamation material so that slopes are geotechnically stable and not prone to concentrated water flows and associated soil erosion. Slopes will then be contoured to match local hill features, stabilized and revegetated according to the final version of this Plan. Naturally-occurring drainages may need to be armored to prevent gullying and increased sedimentation loading to discharge watercourses.



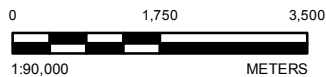


**LEGEND**

- ROAD
- LOCAL ROAD
- WATERCOURSE
- WATERBODY
- POTENTIAL PROJECT ACCESS ROAD
- EXPLOITATION CONCESSION BOUNDARY

**PROJECT FOOTPRINT**

- WASTE ROCK STORAGE FACILITY
- OTHER FACILITIES



**REFERENCE(S)**

BASE DATA AND TOPOGRAPHY PROVIDED BY NEWMONT. IMAGERY OBTAINED FROM COPERNICUS SENTINEL DATA AUGUST 23, 2017.  
 DATUM: WGS84 PROJECTION: UTM ZONE 21

CLIENT  
**NEWMONT SURINAME**

PROJECT  
**SABAJO PROJECT ESIA**

TITLE  
**WASTE ROCK FACILITY LOCATIONS**

CONSULTANT



YYYY-MM-DD 2018-03-01

DESIGNED GJ

PREPARED BDW

REVIEWED GJ

APPROVED GJ

PROJECT NO.  
**1669326**

CONTROL

REV.  
**0**

FIGURE  
**2**

#### 6.1.5 Haul Roads, Camp Facilities, Communications Tower, Access Roads and Laydown Areas

These components cover about 120 ha of the site. At closure, remaining construction material (sand, gravel used for laydown area and access road surfacing) will be moved to an appropriate disposal area. Concrete and pavement will be broken up and transported to an appropriate disposal area. Buildings and other structures related to the Project will be decommissioned and removed from the Project area prior to reclamation, but consideration will be given to retaining certain facilities that may be of ongoing benefit to local residents. The residual soil in these areas is expected to be compacted following structure decommissioning. Bulldozers will deep rip this soil to ameliorate compaction issues and enhance water percolation through this layer. To the extent possible, pre-mine contours and flat areas will be re-established to control drainage and encourage heterogeneous vegetation cover during forest succession. A 20 to 50 cm layer of growth media will then be spread over the facility footprints. Growth media thickness will be adjusted, as necessary, to provide an appropriate rooting zone for vegetation re-establishment. Revegetation will commence immediately following contouring and growth media placement to limit erosion.

#### 6.1.6 Haul Roads

The major haul roads and secondary roads between the pits and WRF will be rehabilitated once no longer in use. Roads critical to monitoring activities will remain open until the point at which monitoring is no longer required. Rehabilitation of haul roads and secondary roads will consist of shaping slopes to minimize erosion and return the footprint to natural appearance, scarifying, hydro seeding and revegetation. It is likely that the Sabajo Merian Haul Road will remain open at closure with a transference of this road to the Government of Suriname (GoS) for ongoing maintenance.

#### 6.1.7 Drill Pads

Rehabilitation of drill pads outside of the operations footprint will proceed concurrently throughout operations. A series of monitoring wells have been (will be) installed in the project footprint. Once monitoring of these wells is no longer required, the wells will either be closed/sealed in place, and the access roads will be reclaimed.

### 6.2 Closure Plan – Social Components

In response to stakeholder concerns and expectations garnered via the ESIA process, Newmont Suriname has made a series of commitments to the Project (ESIA, Volume A, Table 6-1), including a commitment to develop a social component to its Closure Program. As part of this CRP, Newmont Suriname commits to establishing the manner in which it will manage the potential social impacts during closure and post-closure including the following:

- details of how Newmont Suriname will carry out an analysis of alternatives to retrenchment of employees;
- commitments to provide all workers with suitable notice of dismissal and severance payments mandated by law and collective agreements in a timely manner including social benefits and pension payments where relevant;
- provision to engage and coordinate with the GoS where possible regarding potential new opportunities and employment requirements at other projects during the Sabajo closure / post-closure process;



### Closure and Reclamation Plan

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- commitments to establishing the participatory processes and engagement with stakeholders during closure planning;
- commitments to establishing the review and update process for the closure plans;
- commitments to establishing objectives, targets, and monitoring requirements to determine the efficacy of the social closure initiatives;
- commitments to establishing draft closure costs for administration and execution of these processes and plans; and
- commitments to establishing potential community uses of infrastructure after decommissioning and relinquishment of the Site.

#### 6.2.1 Social and Health Closure Initiatives

This section of the CRP is a vehicle for capturing and communicating the social issues affecting closure and which have been identified in the ESIA. Contextual information is important in communicating these issues because it lays out the constraints and opportunities under which Newmont Suriname will develop and ultimately execute its CRP. Social and health issues identified in the ESIA include:

Population and demographics, including:

- Number of people, gender and age composition
- Household composition, density and distribution
- Mobility (migration)
- Educational attainment
- Languages and ethnic affiliation
- Tangible Culture and Heritage
- Indigenous people and human rights
- Social values requiring protection
- Cultural practices and Religion

Livelihood and income streams, including:

- Main economic activities and average incomes
- Agriculture and yield
- Poverty and vulnerable people
- Employment rates and patterns
- Vocational skills and capacity
- ASM

Health statistics at the national level, including:

- Maternal health
- Infant mortality
- Infectious disease (including HIV, malaria and tuberculosis)
- Chronic disease
  - Environmental health
  - Water quality in surface and aquifer resources
- Air quality
- Existing environmental legacies
- Environmental values requiring protection

### 6.2.2 Target Social Closure Outcome and Goals

ICMM (2011) states that the CRP should set out the target closure outcomes and as many goals as practical to allow the operation's development (which culminates in construction and commissioning) to proceed in a manner that does not inadvertently disadvantage the company's later ability to minimize social, environmental, and economic liabilities and to instill sustainable benefits beyond closure. The setting of the target closure outcome must have buy-in from the local community and the government. There may be a considerable engagement process required to set a closure vision that meets the company's and the community's view of the future.

## 7 RECLAMATION APPROACH AND TECHNIQUES

### 7.1 Natural Tropical Forest Soils

The majority of tropical forest soils are old and highly weathered, with low levels of available plant nutrients. Very few weatherable minerals remain in these soils; therefore, the influx of organic material from forest vegetation constitutes the most important nutrient source. The largest portion of plant available nutrients in these soils is often found in the uppermost soil layer, where microorganisms and fine roots are most active. The surface leaf litter layer is usually thin or nonexistent. The amount of soil organic matter in the topsoil (A horizon) is low when compared to temperate forest topsoils.

### 7.2 Reduction in Tropical Forest Soil Quality Related to Project Development

Soil quality refers to the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation (Karlen et al. 1997). Project development is expected to change key soil properties necessary for the successful establishment of a secondary forest following project closure. The synergistic effects of vegetation clearing and soil stockpiling are expected to reduce soil quality, specifically fertility and structure.



### **7.3 Vegetation Clearing**

The removal of forest vegetation is expected to impact both soil fertility and structure. Soil fertility in tropical forests is highly dependent on organic input from forest vegetation. Generally, the majority of nutrients in these ecosystems are sequestered within forest biomass and decaying organic material. Nutrient inputs in tropical forest systems are derived from the recycling of organic material bounded within vegetation. Disruptions to this cycle will likely pose problems in establishment of secondary forest vegetation.

During Project development, forests within the Project boundaries will be cleared, removing sequestered nutrients within the biomass material. This can cut off the most important nutrient source to these soils which may inhibit successful establishment of secondary forest vegetation during reclamation. In small areas and narrower corridors on decompacted soils, revegetation is expected to occur naturally in a relatively short time period. However, for larger areas, additional steps may need to be taken to re-introduce nutrients to the cover soil amendment following mine closure.

Soil organic matter is expected to decrease following vegetation clearing operations due to a loss of litter influx (Ross 1993). Soil organic matter plays a central role in tropical soil fertility. Nutrients are supplied through organic matter decomposition and nutrient availability is provided on soil-organic matter ion exchange sites (Ross 1993). Soil organic matter is also important in the maintenance of soil structure increasing aeration, water percolation and moisture retention.

Soil erosion potential is expected to increase following canopy removal. Soils will no longer be protected by above ground vegetation, which intercepts precipitation, reduces the erosive impacts of falling rain, and also acts as a soil stabilizer through root interactions. Changes in soil structure will also influence soil water holding capacity, encourage over-land drainage and enhance erosion.

### **7.4 Erosion Control, Soil Preparation and Revegetation**

Because of availability, the dominant type of reclamation material is likely to be derived from saprolite that will have low organic matter content and low nutrient status. It will also be prone to sheet, rill and gully erosion that could produce high loads of suspended solids in surface water. The existing saprolite substrate is nutrient depleted so the creation of an organic layer to enhance soil aggregation and plant growth is highly desirable.

Vegetation will be established immediately following placement of reclamation material as both an erosion control measure and to build up soil organic matter in the reclamation material. Newmont Suriname may choose to plant legume vegetation that will fix atmospherically derived nitrogen into the soil. The use of temporary erosion control measures such as downed trees, mats, netting, or silt fences will be implemented where necessary to control erosion prior to establishment of a protective vegetative cover.

### **7.5 Establishing Native Trees**

Native tree species and legume plugs may also be planted at varying densities across reclamation areas to create diversity in species and structure on the reclaimed landscape. In areas prone to erosion, trees will be planted in rows between cover crops. Nitrogen fixing tree species can be used to sequester atmospherically derived nitrogen into reclaimed soils to increase soil fertility (Chaer et al., 2011). De Faria et al. (2010) provides a list of nitrogen fixing tree species as well as climatic variables

that help guide appropriate species selection during reclamation. In the event that vegetation establishment and growth requires acceleration, organic (manure) or synthetic fertilizers will be used.

## 7.6 Inducing Natural Succession

As the reclamation landscape matures, established trees will act as shelter to allow for establishment of understory species. Reclaimed forests are expected to undergo natural successional processes after establishment. In the long-term (>50 years), the ligneous species composition of the secondary forest on the reclaimed land is expected to be similar to that of the surrounding secondary forest types.

## 7.7 Wildlife Habitat and Biodiversity Establishment

### 7.7.1 Biodiversity

Newmont Suriname will use the ecosystem approach to re-establish biodiversity on reclaimed sites. This involves a focus on ecosystem structure, function and process at the species, ecosystem and landscape levels. As the reclaimed landscape evolves, it will increasingly resemble conditions found on comparable sites in the surrounding region.

Reclamation activities will be designed to establish soils with structural and chemical properties that will facilitate the establishment of soil biota (e.g., micro-organisms such as bacteria, arthropods, algae, protozoa and nematodes). These micro-organisms drive ecological functions that support above-ground plant and animal communities. By restoring soil properties, ecological function within terrestrial habitats is expected to re-establish over time.

Revegetation of reclamation areas will be through natural regeneration, where possible, to allow for the establishment of a variety of locally adapted species. Where planting is required, a variety of locally common species typical to the surrounding ecosystem will be planted. Newmont Suriname will strive to integrate reclamation areas with the adjacent area. The biophysical features of the reclaimed landscape are expected to follow a successional pattern similar to the natural landscape.

Techniques that may be used to enhance biodiversity on the reclaimed landscape include:

- Planting tree species in random patterns with varying ratio, abundance and density of prescribed species.
- Planting food plants to attract specific wildlife species.
- Creating micro and meso-topographic variation during site contouring and reclamation material placement.

### 7.7.2 Wildlife Habitat

Over the long term, ecosystems that are re-established on disturbed lands are expected to be self-sustaining, capable of maturing naturally, and will provide suitable habitat for resident and migratory wildlife species. The CC&R Plan aims to establish wildlife habitats compatible with similar areas in the surrounding landscape. This habitat will be achieved through recontouring disturbances to blend with the surrounding environment, re-establishing functional hydrology, replacing reclamation soils and revegetating to locally common, tropical forest species.

## **8 MONITORING**

### **8.1 Reclamation Monitoring**

Short and long term reclamation monitoring programs will be developed and implemented for the Project. The short term program will monitor results achieved by the concurrent reclamation activities and results of reclamation and rehabilitation activities during closure. The long term reclamation monitoring program will be developed to monitor results achieved during closure over a longer period of time to ensure that those results will remain viable in the longer term, and to help optimize reclamation techniques and/or adaptive reclamation procedures to Project-specific requirements. Potential monitoring programs may include efforts that would allow for optimizing reclamation material content, reclamation material placement thicknesses and vegetation species assemblages. Monitoring results in concurrent reclamation areas will be used to improve and seek better closure techniques during the life of the mine. If problems are noted by either program, personnel will be tasked with identifying and implementing alternative approaches to the ineffective program. Both reclamation monitoring programs will ensure that the following parameters are addressed:

- Soil physical and chemical properties
- Soil flora
- Erosion
- Vegetation establishment
- Vegetation growth and cover
- Vegetation health
- Vegetation diversity
- Comparability of reclaimed communities to natural analogues
- Wildlife usage of reclaimed environments

### **8.2 Social Program Efficacy Monitoring**

ICMM (2011) states that the CRP should identify the types of monitoring programs that should be instituted to allow verification that the social closure planning process is meeting pre-selected goals. This will involve socio-economic monitoring which will establish:

- Baseline social conditions, as discussed in Volume A of this (Sabajo) ESIA;
- A method for quantification of changes that might occur as a result of environmental and societal evolution without the mining operation, as discussed in the ESMMP in Volume B, including
  - A quantification of changes that might occur as a result of the mining operation;
  - How progression towards socioeconomic goals can be measured; and
  - How the achievement of socioeconomic goals can be demonstrated.
- A framework including project commitments and mitigation measures required to progress towards social goals, as presented in the Social Management Plan in Volume B; and
- The monitoring and evaluation systems required to demonstrate achievement of social goals, which are under development.

## 9 REPORTING

### 9.1 Internal

Reclamation reporting will be forwarded by October 1<sup>st</sup> of each year and will include:

- An annual reconciliation of actual versus planned concurrent reclamation executed during each year, including a variance analysis;
- Actual costs for reclamation work completed compared to budgeted costs must be reported annually.
- Annual closure and reclamation liability cost analyses are to be updated annually to reflect internal and external changes that impact on those costs;
- Closure and reclamation cost estimates associated with achieving post-closure land use objectives and required maintenance and monitoring activities are to be reported annually; and
- A Post-Closure and Reclamation report is required to detail works completed. The Post-Closure and Reclamation report shall include closure and reclamation objectives and criteria, strategies for the successful closure and reclamation of various aspects of the site (i.e. heap leach, waste rock disposal facilities, tailing storage facilities), as-built surveys for structures, asset liquidation, actual vs. estimated costs and water management plans. The report shall also detail any ongoing activities and related cost estimates.

### 9.2 External

There are no current requirements for external reporting to the GoS or other entities, though Newmont procedures requires reports on aspects of Closure and Reclamation as part of the annual Beyond the Mine reports.

## 10 MANAGEMENT REVIEW

This plan is a living document that will require updating, when appropriate, to include new reclamation technologies, strategies and tools that become available. As the mine plan evolves, the Closure and Reclamation Plan will be adapted to incorporate these changes. At a minimum, the CRP should be updated upon completion of construction and three years prior to planned closure of the Site. Adaptive management will be applied to ensure closure and reclamation goals are met with the most economical and successful reclamation techniques available at the time.

# SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

## Closure and Reclamation Plan

### 11 ROLES AND RESPONSIBILITIES

<b>Project Manager</b>	a) Ensure adequate resources are provided to support the Closure and Reclamation program and provide senior leadership on its importance
<b>Mine Manager</b>	b) Support the reclamation activities
<b>ESR Manager</b>	c) Implement the program and monitor effectiveness d) Identify adaptive management plans as needed to adjust program to improve implementation e) Develop training programs and oversee their implementation f) Assure reclamation is completed
<b>Environmental Superintendent</b>	g) Oversee staff implementation of program h) Complete required reporting (internal and external)
<b>Environmental Officer</b>	i) Conduct required field programs j) Provide on-the-ground support to the operations on implementation of the programs
<b>Social Responsibility Superintendent</b>	<ul style="list-style-type: none"> <li>Cooperate with the Environmental Supervisor to deliver consistent and integrated environmental and social management and monitoring strategies.</li> </ul>
<b>Community Relations</b>	<ul style="list-style-type: none"> <li>Provide regular information on the project at local level and liaise with directly affected communities;</li> <li>Provide regular information on the project to local ASM miners;</li> <li>Keep detailed records of stakeholder communication and actions; and</li> <li>Implement project Stakeholder Engagement Program and manage disputes / grievances.</li> </ul>

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March 2018

# SABAJO PROJECT

## ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### ENVIRONMENTAL AND SOCIAL MONITORING PLAN

Report No. 1669326



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## Abbreviations and Units of Measure

<b>Term</b>	<b>Description</b>
Ag	silver
Al	aluminium
ARD	acid rock drainage
As	arsenic
ASM	artisanal and small scale mining
B	boron
Ba	barium
Be	beryllium
BOD	biological oxygen demand
Ca	calcium
Cd	cadmium
Cl	chlorine
Co	cobalt
COD	chemical oxygen demand
Cr	chromium
Cu	copper
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Monitoring and Management Plan
ETP	Effluent Water Treatment Plant
Fe	iron
Hg	mercury
ICMC	International Cyanide Management Code
IFC	International Finance Corporation
K	potassium
m	meter
m/s	meters per second
Mg	magnesium
Mn	manganese
Mo	molybdenum
Na	sodium
NAG	non-acid generating
Ni	nickel
Newmont	Newmont Suriname, LLC
NIMOS	Nationaal Instituut voor Milieu en Ontwikkeling in Suriname
NO <sub>x</sub>	Oxides of Nitrogen
OWS	oil / water separator
PAG	peroxide acid generating
Pb	lead
PM <sub>10</sub>	particulate matter with mean aerodynamic diameter nominally smaller than 10 microns (µm)

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## SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

### Environmental and Social Monitoring Plan

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<b>Term</b>	<b>Description</b>
PM <sub>2.5</sub>	particulate matter with mean aerodynamic diameter nominally smaller than 2.5 microns (µm)
PWTP	Potable Water Treatment Plant
QC	Quality Control
RoE	Right of Exploitation
Sb	antimony
Se	selenium
SO <sub>2</sub>	sulphur dioxide
the Project	Sabajo Project
TPH	total petroleum hydrocarbons
TSP	total suspended particulate
TSS	total suspended solids
WRF	waste rock facility
Zn	zinc

## 1 PURPOSE

Newmont Suriname, LLC (Newmont) is developing the Sabajo Project (the Project) in eastern Suriname. Sabajo was permitted following the guidelines issued by the Nationaal Instituut voor Milieu en Ontwikkeling in Suriname (National Institute for Environment and Development in Suriname [NIMOS]) and following international best practices, including the general Environmental, Health and Safety Guidelines and other applicable (e.g., Mining, Thermal Power and Waste Management) guidelines from the International Finance Corporation (IFC; 2007a) and the International Cyanide Management Code (2009, 2014). The Environmental and Social Monitoring and Management Plan (ESMMP) prescribes the monitoring program which Newmont Suriname will undertake to measure the social and environmental impacts of the project and assess the performance of risk management controls.

## 2 SCOPE

The scope and specific requirements of the ESMMP will evolve as construction at Sabajo is completed and the site is commissioned, and throughout the operational life of mine. As such the ESMMP will be reviewed and updated as needed to adapt to changes in the project design and operation, as well as to reflect continuous improvement and adaptive management of environmental and social risk and objectives for Sabajo.

The monitoring described in this Plan will also form the basis of the community participatory monitoring program where community members will be trained in sampling methods and actively participate in the monitoring of locations across Sabajo.

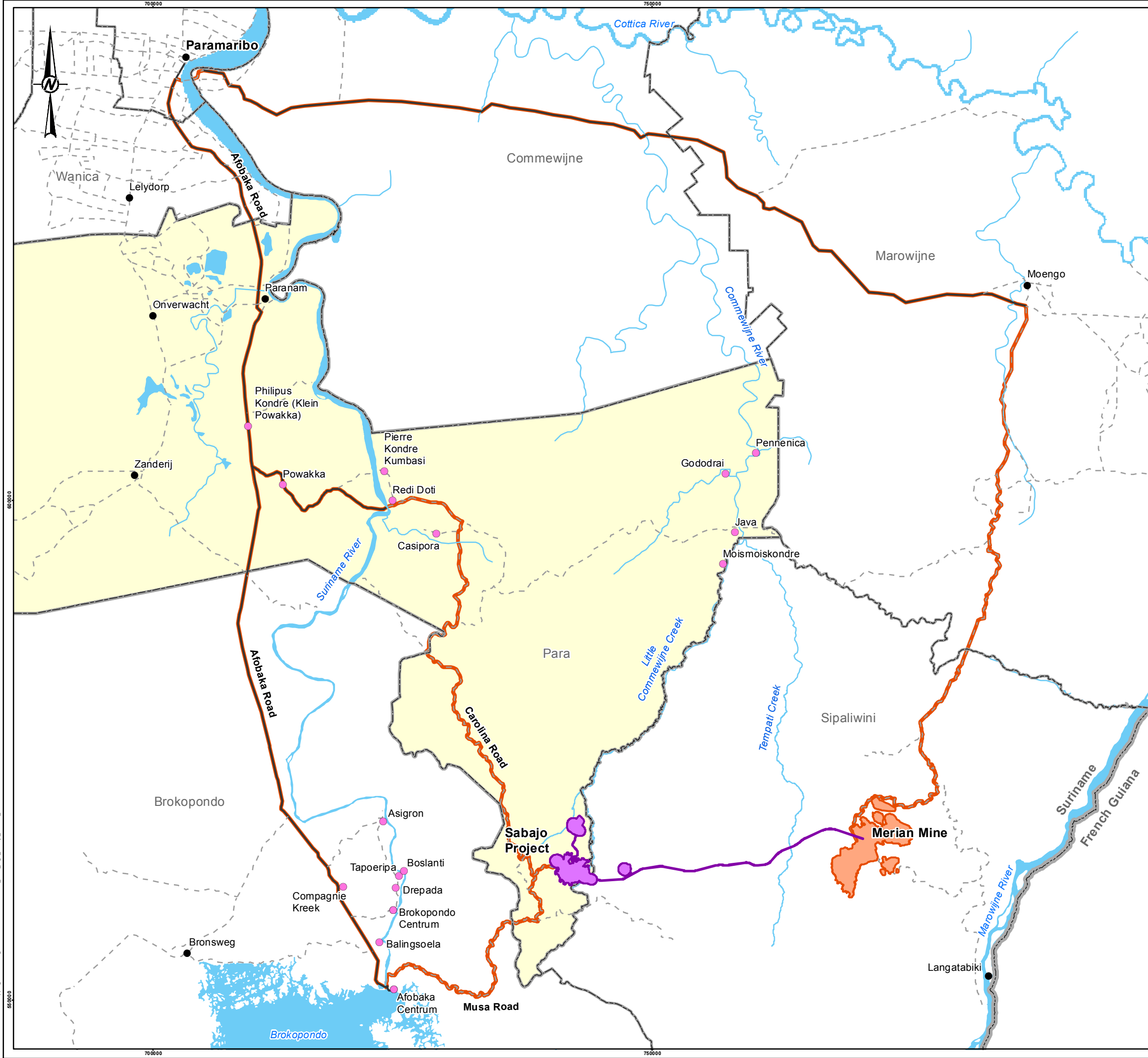
### 2.1 Major Facilities

The location of the Sabajo Project and its access routes are shown in Figure 1. The main facilities at Sabajo are listed below and presented in Figure 2. Major facilities and infrastructure are associated with either: a) the mine, or b) the transportation routes. The Sabajo Mine includes the following primary facilities:

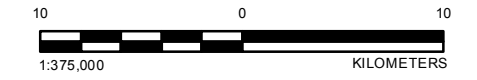
- Six open pits (named Cassador and Pits 2-6) at Sabajo and 2 additional open pits at Margo and Santa Barbara;
- Two waste rock facilities (WRFs) (named North and South) at Sabajo and one WRF each at Margo and Santa Barbara;
- Office and maintenance workshops;
- 1 Mw generator power plant;
- Sedimentation Ponds;
- Borrow areas;
- An accommodation camp;
- Fuel and chemical storage;
- Potable water treatment plant;
- Effluent Water Treatment Plant (ETP);
- Haul roads and other access roads; and,
- Waste management facilities.

The transportation route will include the following:

- Use of the existing Nieuwe Haven Port in Paramaribo and/or the Paranam Port; and
- Use of the existing public road from Paramaribo to either Afobaka Dam (Afobaka Route) or the Carolina Route.



- LEGEND**
- STUDY AREA COMMUNITY
  - OTHER COMMUNITY
  - DISTRICT BOUNDARY
  - INTERNATIONAL BOUNDARY
  - PAVED ROAD
  - - - UNPAVED ROAD
  - WATERCOURSE
  - WATERBODY
  - POTENTIAL PROJECT ACCESS ROUTES
  - SABAJO PROJECT PHYSICAL IMPACT AREA
  - MERIAN MINE EXISTING AND APPROVED FOOTPRINT



**REFERENCE(S)**  
 BASE DATA AND TOPOGRAPHY PROVIDED BY NEWMONT.  
 DATUM: WGS84 PROJECTION: UTM ZONE 21

**CLIENT**  
 NEWMONT SURINAME

**PROJECT**  
 SABAJO PROJECT ESIA

**TITLE**  
 SABAJO ACCESS ROUTES

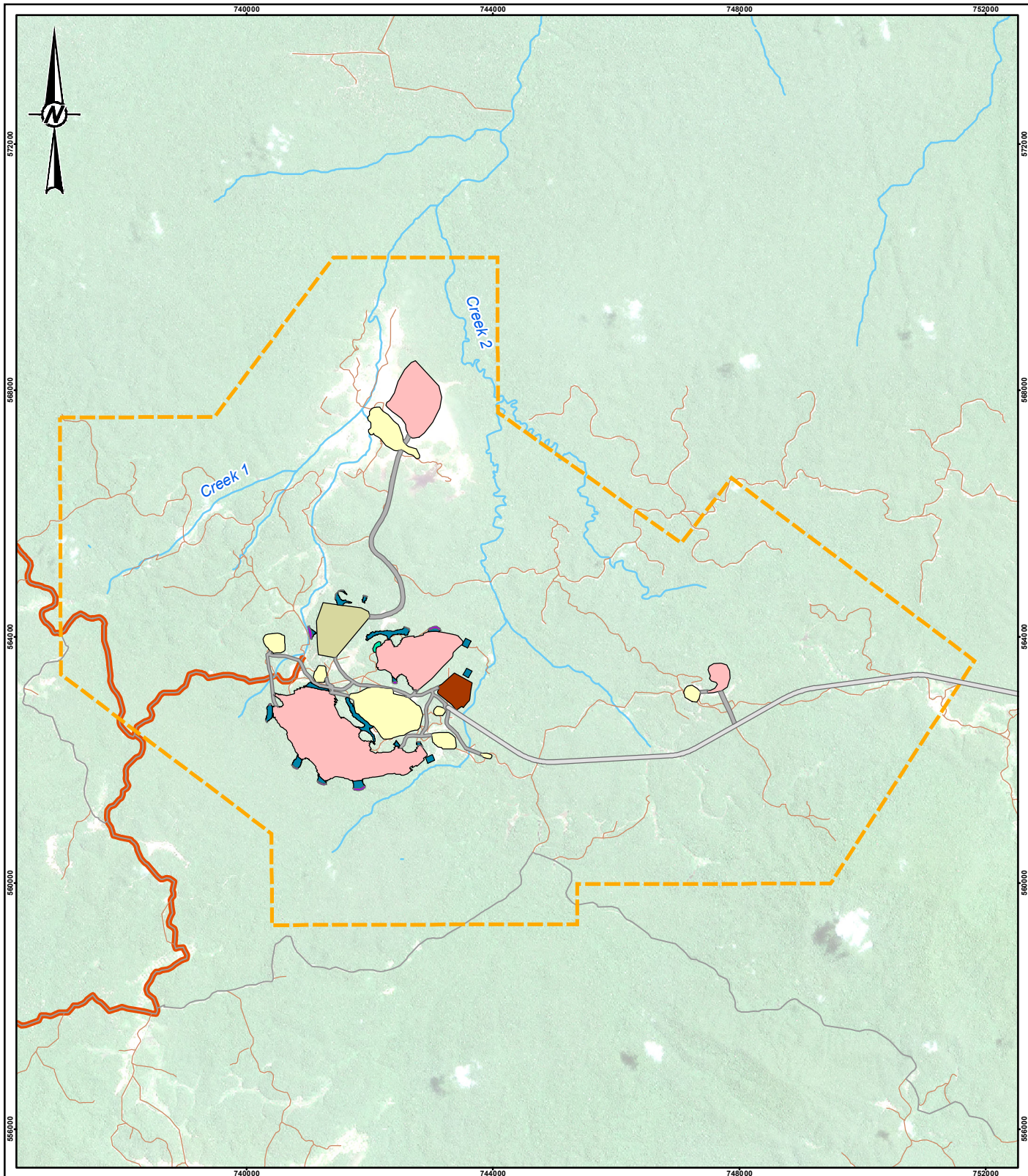
CONSULTANT	YYYY-MM-DD	2018-03-01
	DESIGNED	JP
	PREPARED	PT
	REVIEWED	GJ
	APPROVED	GJ

PROJECT NO. 1669326 CONTROL REV. 0 FIGURE 1

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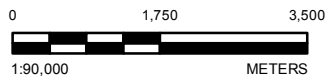


**LEGEND**

- ROAD
- LOCAL ROAD
- WATERCOURSE
- WATERBODY
- POTENTIAL PROJECT ACCESS ROAD
- EXPLOITATION CONCESSION BOUNDARY

**PROJECT FOOTPRINT**

- PIT
- STOCKPILE
- WASTE ROCK STORAGE FACILITY
- SURFACE FACILITIES
- LANDFILL
- ROAD
- MERIAN TRANSPORT CORRIDOR
- WATER MANAGEMENT BERM
- WATER MANAGEMENT POND



**REFERENCE(S)**

BASE DATA AND TOPOGRAPHY PROVIDED BY NEWMONT. IMAGERY OBTAINED FROM COPERNICUS SENTINEL DATA AUGUST 23, 2017.  
 DATUM: WGS84 PROJECTION: UTM ZONE 21

CLIENT  
**NEWMONT SURINAME**

PROJECT  
**SABAJO PROJECT ESIA**

TITLE  
**MAJOR FACILITIES AT SABAJO**

CONSULTANT



YYYY-MM-DD 2018-03-01

DESIGNED GJ

PREPARED PT

REVIEWED GJ

APPROVED GJ

PROJECT NO.  
**1669326**

CONTROL

REV.  
**0**

FIGURE  
**2**



### **3 LEGAL FRAMEWORK**

As part of the permitting process for Sabajo a Draft Environmental and Social Impact Assessment (ESIA) was completed by Golder Associates Inc. (Golder 2018). Section 2.0 of the ESIA discusses the legal framework for Sabajo. In general, the project has been designed and permitted to be compliant with Surinamese, Newmont Suriname and international standards. As noted earlier, the project has also been designed and is being constructed and operated to be consistent with the applicable IFC guidelines as per the Mineral Agreement and compliant with the International Cyanide Management Code (ICMC).

## 4 CLIMATE

Suriname experiences a tropical climate with wet and dry seasons. Project climate monitoring at Sabajo started in 2010 during exploration activities. Climate data has been used in the ESIA evaluation. Due to the limited period of record, the Merian design climate data was used for design considerations for design of the sediment control facilities and for the water balance. This section discusses the plan for continued monitoring of climate data, which will be used to refine Project engineering designs and the operational water balance as the project progresses.

### 4.1 Objectives

The principal objectives of the climate monitoring program at Sabajo are:

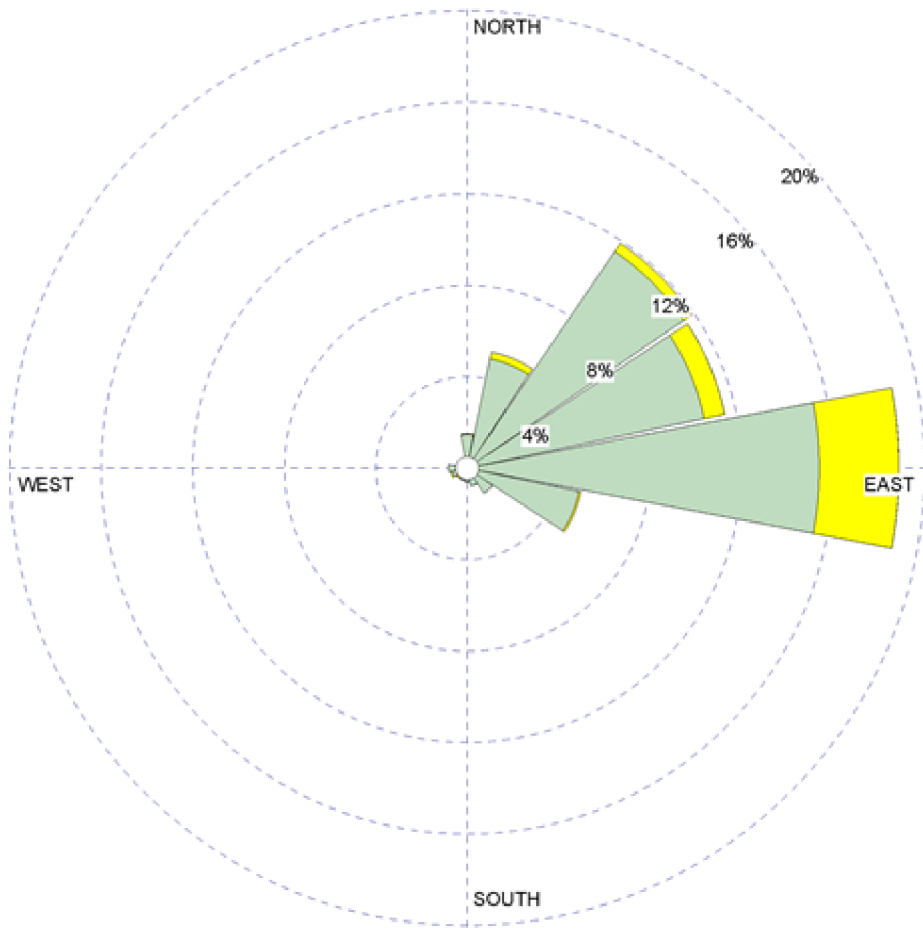
- Continue to capture a comprehensive record of the local climate;
- Support the updating and verification of the hydrological modelling for project, including the site-wide water balance;
- Support engineering designs, including those for sediment control structures, the water treatment plant and the pit dewatering system and,
- Evaluate long-term climate trends which could impact the project.

### 4.2 Locations

The monitoring location for climate data was established by evaluating historic data to determine the most practicable location to collect relevant data. Based on the climate data collected to-date, it is known that winds are generally low speed (less than 5 kilometers per hour) and that the predominant wind direction is from the East and South-east as shown in Figure 3. There is currently one climate station installed at the project site to measure a range of climate variables. The weather station was installed in November 2011 as part of construction activities and is located near the exploration camp. Throughout the life of mine this facility may be relocated as needed to ensure that the most accurate and relevant climate data is available to support mining operations. The location of the weather station is displayed on Figure 4.

**11 November 2011 - 31 December 2016 Wind Rose Plot  
Newmont Suriname Sabajo Meteorological Station**

**Wind Speed  
Direction (blowing from)**



**WIND SPEED (m/s)**

- >= 11.1
- 8.8 - 11.1
- 5.7 - 8.8
- 3.6 - 5.7
- 2.1 - 3.6
- 0.5 - 2.1

Calms: 39.28%

CLIENT  
**NEWMONT SURINAME**

PROJECT  
**SABAJO PROJECT ESIA**

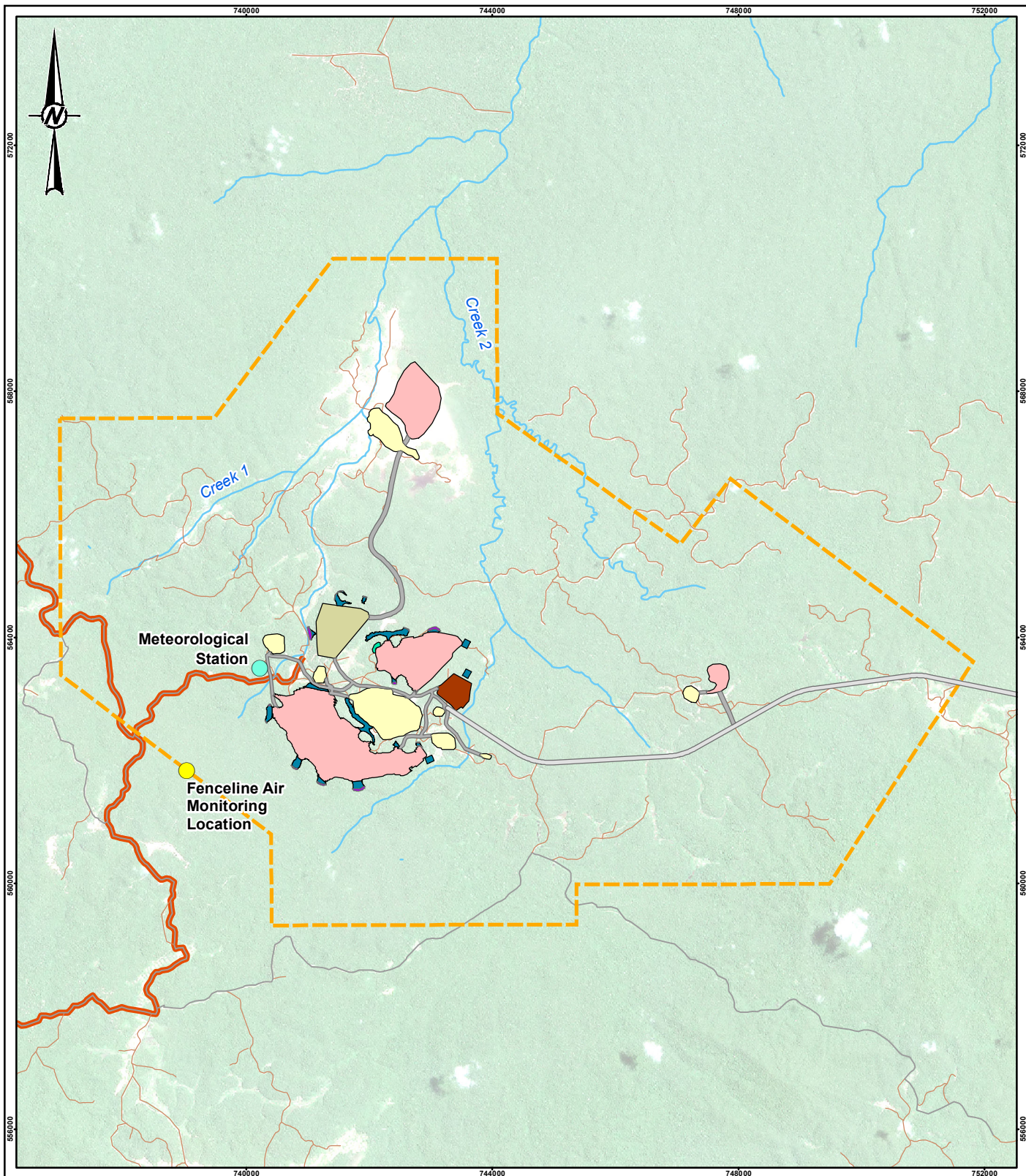
TITLE  
**WIND ROSE PLOT FOR THE SABAJO PROJECT**

CONSULTANT	YYYY-MM-DD	2018-03-01
	DESIGNED	GJ
	PREPARED	BDW
	REVIEWED	GJ
	APPROVED	GJ

**REFERENCE(S)**  
BASE DATA AND TOPOGRAPHY PROVIDED BY NEWMONT. IMAGERY OBTAINED FROM COPERNICUS SENTINEL DATA AUGUST 23, 2017.  
DATUM: WGS84 PROJECTION: UTM ZONE 21

PROJECT NO. 1669326 CONTROL REV. 0 FIGURE 3



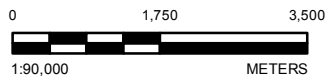


**LEGEND**

- ROAD
- LOCAL ROAD
- WATERCOURSE
- WATERBODY
- POTENTIAL PROJECT ACCESS ROAD
- EXPLOITATION CONCESSION BOUNDARY
- AIR MONITORING STATION
- METEOROLOGICAL STATION

**PROJECT FOOTPRINT**

- PIT
- STOCKPILE
- WASTE ROCK STORAGE FACILITY
- SURFACE FACILITIES
- LANDFILL
- ROAD
- MERIAN TRANSPORT CORRIDOR
- WATER MANAGEMENT BERM
- WATER MANAGEMENT POND



**REFERENCE(S)**

BASE DATA AND TOPOGRAPHY PROVIDED BY NEWMONT. IMAGERY OBTAINED FROM COPERNICUS SENTINEL DATA AUGUST 23, 2017.  
 DATUM: WGS84 PROJECTION: UTM ZONE 21

CLIENT  
**NEWMONT SURINAME**

PROJECT  
**SABAJO PROJECT ESIA**

TITLE  
**METEOROLOGICAL STATION AND FUTURE AIR MONITORING STATION LOCATION**

CONSULTANT



YYYY-MM-DD 2018-03-01

DESIGNED GJ

PREPARED PT

REVIEWED GJ

APPROVED GJ

PROJECT NO.  
**1669326**

CONTROL

REV.  
**0**

FIGURE  
**4**

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### **4.3 Parameters and Frequency**

Climate monitoring measures the following parameters:

- Horizontal wind speed and wind direction;
- Temperature;
- Relative humidity;
- Solar radiation;
- Barometric pressure;
- Precipitation; and,
- Evaporation.

Each of these parameters are measured continuously every one second. This per-second data is averaged and recorded in 15-minute, 60-minute and 24-hour periods.

### **4.4 Equipment**

Specific equipment that is used to collect climate data at the weather station is presented in Table 1. This equipment was selected and installed under the guidance of a consultant with technical expertise in air quality and climate monitoring.

### **4.5 Criteria**

There are no specific compliance criteria for climate monitoring applicable to Sabajo. Data is monitored to inform Newmont Suriname of the climatic conditions in which it is operating as these conditions can have direct impacts to construction and operations activities.



# SABAJO ENVIRONMENTAL AND SOCIAL MONITORING AND MANAGEMENT PLANS

## Environmental and Social Monitoring Plan

**Table 1 Monitoring Parameters and Equipment Specifications Sabajo Meteorological Station**

Parameter	Instrument Description-Model	Units of Measure	Instrument Serial Number	Sensor Accuracy	Range	Instrument Location
10-Meter Horizontal Wind Speed	RM Young Model 05305 AQ	Meters Per Second (m/s)	112164	± 0.2 m/s	0 – 50 m/s	10 meters AGL
10-Meter Horizontal Wind Direction	RM Young Model 05305 AQ	Degrees (°)	112164	± 3 °	0 – 360 °	10 meters AGL
Wind Direction Standard Deviation	RM Young Model 05305 /Campbell Scientific CR1000	Degrees (°)	N/A	N/A	0 – 360 °	10 meters AGL
10-Meter Vertical Wind Speed	RM Young Model 27106T	Meters Per Second (m/s)	01677	± 0.3 m/s	0 – 25 m/s	10 meters AGL
2-Meter Temperature	Campbell Scientific Model CS215-L10	Degrees Celsius (°C)	E7320	±0.4°C (+5 to +40°C)	-40 °C to +70 °C	2 meters AGL
2-Meter Relative Humidity	Campbell Scientific Model CS215-L10	Percent Relative Humidity (RH)	E7320	±2% (10-90%); ±4% (0-100%)	0 to 100% RH	2 meters AGL
2-Meter Solar Radiation	Li-Cor Model LI200X-L10	Watts per Square Meter (W/m <sup>2</sup> )	PY74574	±5% (for daily total radiation)	0 – 2,000 W/m <sup>2</sup>	2 meters AGL
Precipitation – Tipping Bucket Rain Gauge	Texas Electronics Model TE525WS-L30	Millimeters of water (mm)	H4860	±1% (up to 25.4 mm per hour)	Infinite in increments of tip	2 meters AGL
Barometric Pressure	Vaisala Model CS106	mm of Mercury (Hg)	G3260056	±0.2 mm Hg (at +20°C)	375 – 825 mm Hg	Enclosure
Evaporation Float Gauge	Novalynx Model 255-100	Centimeters of water (cm)	1562	0.25%	0 – 25 cm	Ground Level
Evaporation Pan	Novalynx Model 255-200	N/A	N/A	N/A	N/A	Ground Level
Meteorological Tower Data Logger	Campbell Scientific Model CR1000	N/A	37134	N/A	0 – 5 Volts	Enclosure
20-Watt Solar Panel	Campbell Scientific Model SP20	N/A	I31102209AB016D	N/A	N/A	2 meters AGL
10-Meter Tower	Campbell Scientific Model UT30	N/A	N/A	N/A	N/A	Ground Level

m/s = Meter per second; N/A Not applicable

#### 4.6 Data Management and Quality Control

The Weather Station is equipped with a data logger within the equipment control box. All climate monitoring data is directly recorded and stored in these data loggers. Further to this, the Environmental Department routinely downloads the climate data from the data loggers and imports it to the Environmental Monitoring Database<sup>1</sup>.

The climate station undergoes routine maintenance and calibration, which occurs annually by a certified and authorized third party. Downloaded data is routinely checked by the Environmental Department for completeness and quality in order to determine, on a timely basis, if a sensor has stopped working or if there are other problems that need to be addressed to ensure reliable data collection. On an annual basis an appropriate external party conducts a data review to further assess its validity and detect any technical errors.

#### 4.7 Reporting

An annual climate report will be generated.

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<sup>1</sup> The Environmental Monitoring Database is a SQL database housed on Newmont Suriname's applications server. Newmont Suriname utilises a Monitor Pro 5 database, commissioned by EHS Data Management Software.



## **5 AIR QUALITY**

This section covers both ambient and point-source air quality (gases and particulates) monitoring at Sabajo. While not specifically monitored, the site will also complete an annual estimate of greenhouse gas emissions once in the operations phase.

### **5.1 Objectives**

The main objectives for the air quality monitoring program are:

- Demonstrate conformance with air quality and emissions criteria;
- Complete auditing of the use of emission controls on the mobile fleet of the mine; and,
- Identify if contingency actions or additional mitigation measures (e.g., dust controls) are needed to ensure compliance with applicable air quality or emissions standards.

### **5.2 Locations**

The emissions associated with construction, operations, and closure phases will occur concurrently throughout the Project life. The major fugitive dust and combustion emission sources associated with the Project are the mining equipment (Table 5.3-5 in Section 5.3 of the ESIA). The proposed location for monitoring ambient air quality was selected to be consistent with this premise.

#### **5.2.1 Ambient Air**

During the construction period, the primary focus of the air quality monitoring is ambient air quality. The monitoring network consists of a primary station and two portable secondary stations. The ambient monitoring locations for air quality were established to assess the compliance of applicable air standards and guidelines during the life of the mine. Sabajo is generally isolated from human receptors, with the closest permanent inhabitants located to the southwest (Afobaka 37 km) and northwest (Powakka 88 km).

During the construction period, the Primary Air Quality Station is located downwind of the main pit. Figure 4 shows the location of proposed air quality monitoring station at the Project site. In the event that the Carolina Route is chosen as the preferred alternative for the transportation route, an additional air quality monitoring location will be selected as this road is unpaved in the vicinity of Powakka.

### **5.3 Parameters and Frequency**

#### **5.3.1 Ambient Air**

For ambient air monitoring, the following parameters are monitored: NO<sub>x</sub>, SO<sub>2</sub> and PM<sub>10</sub>, PM<sub>2.5</sub>, Total Suspended Particles (TSP).

### **5.4 Equipment**

Mobile air quality monitoring instruments will be used during construction at Sabajo.

The continuous particle monitor records instantaneous particle levels and provides output as required time averages. Wind speed and wind direction sensors are co-located with the primary monitoring station. Real time ambient air monitoring is conducted for SO<sub>2</sub> and NO<sub>x</sub> using continuous ambient air analysers equipped with a data logging / data acquisition system listed above.

Equipment will be maintained and calibrated according to manufacturer standards on an annual frequency utilising the services of third-party air quality specialist technicians.

## 5.5 Criteria

### 5.5.1 Ambient Air

Ambient air quality standards to be applied to the construction and operations phases of the Sabajo project are specified in Table 2. Compliance criteria for ambient air quality were derived from the IFC Environmental Health and Safety (EHS) General Guidelines (IFC 2007). Ambient air quality criteria are assessed at the designated monitoring location specified in Section 5.2.

**Table 2 Ambient Air Quality Criteria**

Pollutant	Averaging Period	Units	Criteria
PM <sub>10</sub> *	24-hour	µg/m <sup>3</sup>	50
	Annual	µg/m <sup>3</sup>	20
PM <sub>2.5</sub> *	24-hour	µg/m <sup>3</sup>	25
	Annual	µg/m <sup>3</sup>	10
NO <sub>2</sub> *	1-hour	µg/m <sup>3</sup>	200
	Annual	µg/m <sup>3</sup>	40
SO <sub>2</sub> *	10-minute	µg/m <sup>3</sup>	500
	24-hour	µg/m <sup>3</sup>	20

\* Values listed are from the IFC General EHS General Guidelines (2007)

IFC = International finance Corporation; EHS = Environment, Health and Safety; PM<sub>10</sub> = particulate matter with mean aerodynamic diameter nominally smaller than 10 microns; PM<sub>2.5</sub> = particulate matter with mean aerodynamic diameter nominally smaller than 2.5 microns; NO<sub>2</sub> = nitrogen dioxide; SO<sub>2</sub>\* = sulfur dioxide; µg/m<sup>3</sup> = micrograms per cubic meter.

## 5.6 Data Management and Quality Control

The QA/QC program for air quality monitoring includes the following:

- Field personnel operating ambient air sampling monitoring are adequately trained in the operation of the equipment and understanding of the methodology;
- A Project Quality Assurance Plan and Standard Operating Procedures are implemented; and
- Continuous monitoring equipment is calibrated to the manufacturer's specifications and frequency.

## 5.7 Reporting

Data collected is summarized in quarterly reports. The reports include:

- A narrative of what the report covers, including any changes in the monitoring since the previous report;
- Presentation of the results and a comparison to criteria; and
- A discussion of any exceedances of criteria and actions taken to remedy the exceedance.

An annual summary of air quality monitoring data will be included in the annual environmental reports provided for each production year. The format and presentation will be completed in a manner acceptable to NIMOS.

## 6 SURFACE WATER QUALITY

The ESIA identified potential impacts to surface and groundwater quality and quantity as some of the highest risks prior to mitigation. Targeted monitoring is therefore completed on water discharges from the internal water management system, and of ambient water quality for surface water. Potential sources of discharge to water include the mining operations (e.g., pit dewatering and discharges from sediment control structures), and the sewage treatment plant. Due to the importance placed on water management, this version of the ESMMP includes monitoring both in the construction and operations phases of the Project. Subsequent updates to the ESMMP will focus solely on the operations phase.

### 6.1 Objectives

Mitigating impacts to water quality and quantity as a result of mining operations at Sabajo has been evaluated in the ESIA, and as water is considered a valuable resource, the protection of water resources is considered a core component of the monitoring program. Operations at Sabajo have the potential to alter water quality and quantity within the local area, especially with respect to the water management of the WRFs. The objectives of the surface water monitoring program are to:

- Confirm that the discharge standards specified in the ESIA are met;
- Ensure compliance with commitments in the ESIA for monitoring at locations agreed upon with NIMOS;
- Confirm pollution control devices constructed at Sabajo are sufficient to maintain environmental impacts to within approved compliance limits;
- Confirm that water is effectively managed at Sabajo so that water quality at the designated compliance points in each basin is protective of human health and the environment; and,
- Provide data needed to update the operational water balance and to support operational management.

### 6.2 Locations

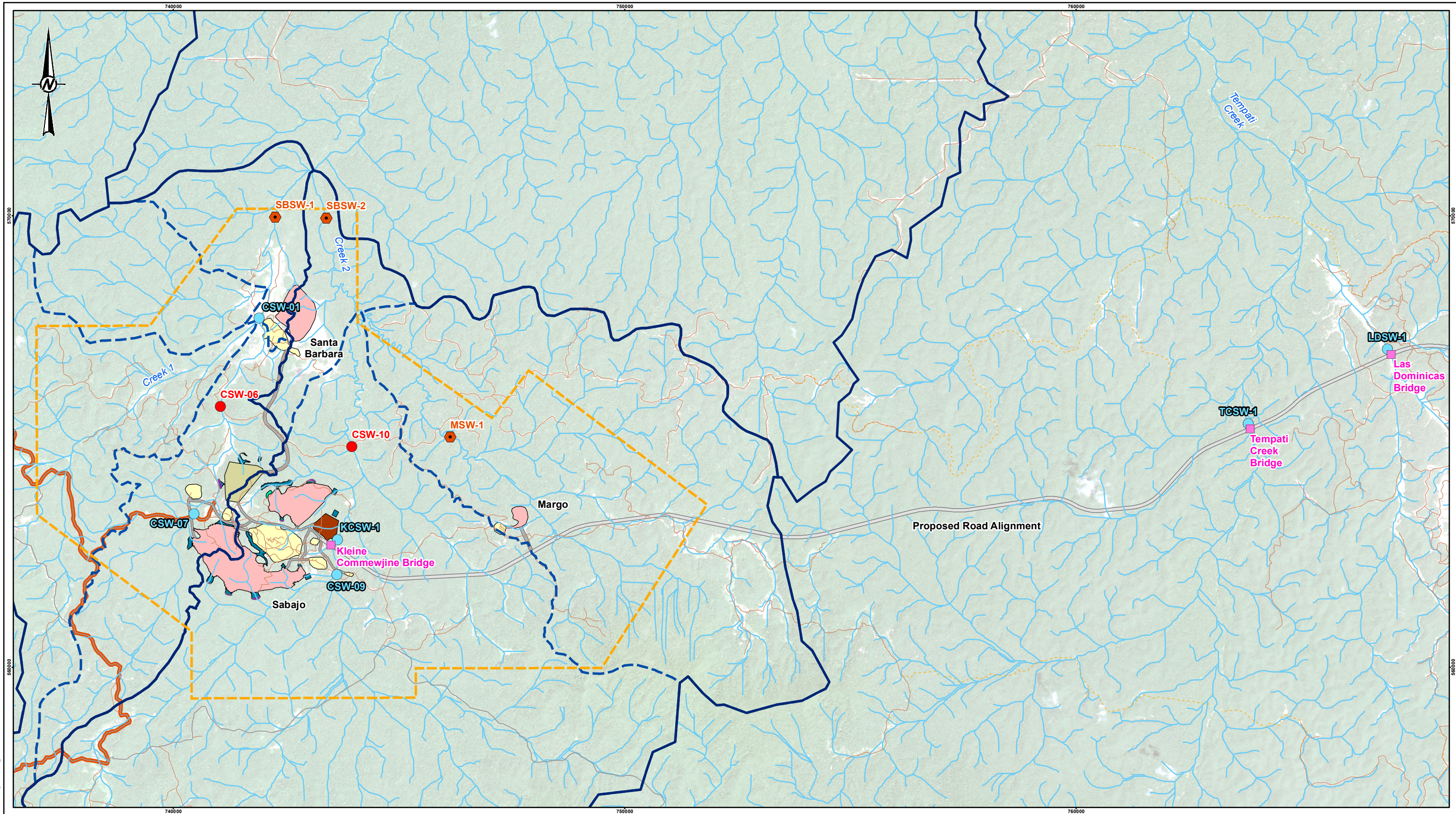
#### 6.2.1 Compliance

This ESMMP specifies two ambient water compliance points to monitor downstream of the Sabajo Operations (Figure 5). These are:

- CSW-10 which monitors the eastern portion of the project area downstream of the Northern and Southern WRFs, the ore stockpile, and the pits, and
- CSW-6 which monitors the stream downstream of the Project support facilities (Camp, offices, fuel and power stations), a satellite pit, and the western portion of the Southern WRF.

Three additional compliance points are planned to monitor the effectiveness of the mitigation on the Santa Barbara and Margo deposits. SBSW-1 and SBSW-2 are proposed to monitor downstream of the Santa Barbara operations, and MSW-1 is proposed to monitor downstream of the Margo Operations as shown in Figure 5. These deposits are not planned to be mined until 2034. As such, the monitoring of these sites will not be initiated until one year before the proposed construction of the support facilities (WRFs) begins.





**LEGEND**

ROAD	BRIDGE LOCATION	PROPOSED COMPLIANCE POINT
LOCAL ROAD	<b>PROJECT FOOTPRINT</b>	COMPLIANCE POINT
ATV TRAIL	PIT	POINT OF INTEREST
WATERBODY	STOCKPILE	DRAINAGE BOUNDARY
WATERCOURSE	WASTE ROCK STORAGE FACILITY	SUB-BASIN BOUNDARY
POTENTIAL PROJECT ACCESS ROAD	SURFACE FACILITIES	
EXPLOITATION CONCESSION BOUNDARY	LANDFILL	
	ROAD	
	MERIAN TRANSPORT CORRIDOR	
	WATER MANAGEMENT BERM	
	WATER MANAGEMENT POND	



CLIENT  
NEWMONT SURINAME

CONSULTANT	YYYY-MM-DD	2018-03-01
	DESIGNED	GJ
	PREPARED	BP
	REVIEWED	GJ
	APPROVED	GJ

REFERENCE(S)  
BASE DATA AND TOPOGRAPHY PROVIDED BY NEWMONT. IMAGERY OBTAINED FROM COPERNICUS SENTINEL DATA NOVEMBER 1, 2016.  
DATUM: WGS84 PROJECTION: UTM ZONE 21

PROJECT  
SABAJO PROJECT ESIA

TITLE  
**FUTURE SURFACE WATER MONITORING LOCATIONS**

PROJECT NO.	CONTROL	REV.	FIGURE
1669326		0	5

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In addition to the compliance points proposed, two other points of interest will be monitored as part of the surface water monitoring program in the Sabajo concession area. These include CSW-1 and CSW-7. Three additional points of interest will be monitored downstream of the proposed bridges on the Sabajo-Merian Haul road, KCSW-1 (Kleine-Commewijne), TCSW-1 (Tempati Creek) and LDSW-1 (Las Dominicanas on the Merian side) are also shown on Figure 5.

In addition, the effluent from the sewage water treatment plant, and when operational the effluent treatment plant (ETP), the sedimentation ponds, and the potable water treatment plant would also be monitored. The exact location of the water treatment plants has yet to be determined, but will be located in the area of the Construction/Operations Camp.

**6.3 Parameters and Frequency**

The key parameters to be monitored in the various surface water sources at Sabajo include the following:

- Field Parameters: pH, temperature, specific conductivity, dissolved oxygen, turbidity and flow;
- General Chemistry: Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Alkalinity, Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD);
- Biological: Total Coliforms and Fecal Coliforms;
- Nutrients: Nitrate+Nitrite, Ammonia, and Phosphorous;
- Major Ions: SO4, Cl, Mg, Ca, K, Na, and S (sulphide);
- Organics: Total Petroleum Hydrocarbons (TPH), Oil and Grease; and,
- Metals (Total and/or Dissolved): Ag, Al, As, B, Ba, Be, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Se and Zn.

Cyanide was not analysed during collection of the baseline studies nor will it be monitored during operations, as this constituent will not be used on site. All other parameters will be monitored at relevant monitoring points, as required. During construction the primary constituent of concern in surface water is Total Suspended Solids (TSS). Baseline monitoring in the area demonstrated very high TSS readings in areas affected by artisanal and small scale mining (ASM), and in many cases the elevated TSS results continued long after the ASM activities ceased in the catchment.

Monitoring frequencies for the various surface water monitoring points generally follow the schedule presented in Table 3. In some instances, a sub-set of the parameters in the above list are monitored at certain locations.

**Table 3 Surface Water Monitoring Parameters and Frequency**

Parameter Group	Ambient Water Compliance Points	Sedimentation Ponds	Sewage Treatment Plants	Potable Water Treatment Plant	Effluent Treatment Plant
Field Measurements	Weekly	Weekly	Monthly	Monthly	Weekly
General Chemistry	Weekly	Weekly	Monthly	Monthly	Weekly
Biological	Monthly	Monthly	Monthly	Monthly	-
Nutrients	Monthly	Monthly	Monthly	Monthly	Weekly
Major Ions	Monthly	Monthly	-	Monthly	Weekly
Organics	Monthly	Monthly	Monthly	-	-
Metals	Monthly	Quarterly	-	Quarterly	Monthly

## 6.4 Equipment

Required equipment for surface water monitoring in the field, including sample collection, includes:

- Portable multi-meters for field parameters;
- Extendable sample pole;
- Water sample filters (for analysis of dissolved metals, the sample will need to be filtered through a certified clean 0.45 µm filter using a peristaltic pump);
- Sample bottles (both unpreserved and preserved as required for specific analyses); and,
- Sterile gloves.

A fully-equipped laboratory has been constructed at Merian. The on-site laboratory includes the following equipment:

- Automatic cyanide analyser;
- Auto titrator for nitrogen;
- Cold vapor/FIMS for mercury;
- LECO Carbon and Sulfur analyser; and,
- Microwave plasma-atomic emission spectrometer.

Further to this Newmont Suriname will engage with external laboratories to provide analyses unable to be completed on-site, and also to confirm results generated on-site as part of the QC process (see Section 6.6).

## 6.5 Criteria

Compliance criteria for surface water, both ambient and point source, were developed during the feasibility environmental and social baseline studies and committed to in the ESIA (Golder 2018). There are no applicable criteria in Suriname for ambient water quality and therefore risk-based ambient water quality criteria were determined to be protective of human health and the environment. These criteria are generally based on limits determined by either the IFC or the USEPA in lieu of applicable local criteria. Ambient water quality criteria to be met at the compliance points, are presented in Column C of Table 4.

**Table 4 Project Water Quality Standards**

Standard Type		Legal Effluent		Drinking Water		Aquatic Life
Applicability		Mine Effluent		Groundwater		Surface Water
Dissolved or Total Metals <sup>(a)</sup>		Total Metals		Total Metals		Dissolved Metals <sup>(b)</sup>
Parameter	Units	Column A	Source <sup>(a)</sup>	Column B	Source <sup>(a)</sup>	Column C
pH	s.u.	6 - 9	IFC <sup>(c)</sup>			6.4 - 8.4
Temperature	°C	<3 degree change	IFC <sup>(c)</sup>			
Total Suspended Solids (TSS)	mg/L	50	IFC <sup>(c)</sup>			
Total Dissolved Solids (TDS)	mg/L			2,000		1000
Nitrate as N	mg/L			10	MCL	13
Nitrite as N1	mg/L			1	MCL	
Ammonia as N	mg/L-N					2.5 <sup>(d)</sup>
Sulfate	mg/L			1,500		3000

**Table 4 Project Water Quality Standards**

Standard Type		Legal Effluent		Drinking Water		Aquatic Life
Applicability		Mine Effluent		Groundwater		Surface Water
Dissolved or Total Metals <sup>(a)</sup>		Total Metals		Total Metals		Dissolved Metals <sup>(b)</sup>
Parameter	Units	Column A	Source <sup>(a)</sup>	Column B	Source <sup>(a)</sup>	Column C
Aluminum	mg/L			37		0.087
Antimony	mg/L			0.006	MCL	0.24
Arsenic	mg/L	0.1	IFC <sup>(c)</sup>	0.01	MCL	0.15
Barium	mg/L			2	MCL	0.04
Beryllium	mg/L			0.004	MCL	0.0001
Boron	mg/L			7.3		5
Cadmium	mg/L	0.05	IFC <sup>(c)</sup>	0.005	MCL	0.0004
Chromium (Total or VI)	mg/L	0.1	IFC <sup>(c)</sup>	0.1	MCL	0.01
Chloride	mg/L					230
Chlorine	mg/L			4	MCL	0.011
Cobalt	mg/L			0.35		0.1
Copper	mg/L	0.3	IFC <sup>(c)</sup>	0.2		0.0686 <sup>(e)</sup>
Fluoride	mg/L			4	MCL	
Iron	mg/L	2	IFC <sup>(c)</sup>	26		1
Lead	mg/L	0.2	IFC <sup>(c)</sup>	0.015	AL	0.003
Manganese	mg/L			0.88		0.3
Mercury	mg/L	0.002	IFC <sup>(c)</sup>	0.002	MCL	0.0008
Molybdenum	mg/L			0.18		3.2
Nickel	mg/L	0.5	IFC <sup>(c)</sup>	0.73		0.007
Selenium	mg/L			0.05	MCL	0.005
Silver	mg/L			0.18		0.0001
Thallium	mg/L			0.002	MCL	0.007
Zinc	mg/L	0.5	IFC <sup>(c)</sup>	5		0.02
Biological Oxygen Demand (BOD)	mg/L	50	IFC <sup>(c)</sup>			
Chemical Oxygen Demand (COD)	mg/L	150	IFC <sup>(c)</sup>			
Oil and Grease	mg/L	10	IFC <sup>(c)</sup>			
Phenols	mg/L	0.5	IFC <sup>(c)</sup>			
Total Coliforms	MPN/100 mL	400	IFC			

Notes:

Water quality standards based on Merian Operation standards.

Project water quality standards may be revised if baseline concentrations exceed standards. Project water quality standards may also be adjusted due to site-specific conditions using accepted scientific practices.

a) Sources:

IFC = International Finance Corporation (IFC 2007a [most parameters] and IFC 2007b [coliform])

IFC (2007a) cyanide species standards not included in table since there will be no cyanide use in the Project area.

MCL = maximum contaminant level, USEPA drinking water standards (USEPA 2009)

AL = action level, USEPA drinking water standards (USEPA 2009)

For standards without a specific source referenced see Meyer (2011)

b) Dissolved metals with the exception of Al (total recoverable), Fe (total) and Se (total). Grey shading identifies aquatic standards that are hardness dependent. A hardness of 10 mg/L as CaCO<sub>3</sub> is assumed.

c) IFC guidelines should be achieved, without dilution, at least 95 percent of the time.

d) Based on USEPA (1999). Assumes a pH of approximately 6.7 and a temperature of 29 °C.

e) Site specific value based on site-specific testing (GEI Consultants 2017)

IFC = International Finance Corporation; USEPA = United States Environmental Protection Agency; N = nitrogen; Cr = chromium; AL = aluminum; Fe = iron; Se = selenium; s.u. = standard units; mg/L = milligrams per liter; MPN/100 mL = most probable number per 100 milliliters; °C = degrees Celsius; mg/L-N = milligrams per liter nitrogen; CaCO<sub>3</sub> = calcium carbonate; <= less than.



It is important to note that these criteria are generic in nature and can be modified to reflect the specifics of the site using scientifically supported methodologies, which may include consideration of site-specific background as was recently completed for Merian (GEI 2017). Newmont Suriname has committed to meet the IFC criteria of 50 mg/L of TSS. This value is to be met during 95% of the operational period, which means that during large storm events, TSS values can exceed the 50 mg/L criteria. The IFC guidelines also recognize that baseline TSS levels may exceed the criteria and that baseline characterization of TSS levels can support a higher criteria value that reflects the baseline conditions.

The criteria for discharges from sewage treatment plants are presented in Table 5. These values are based on IFC guidelines. The listed criteria are only applicable to effluent discharged to the environment.

**Table 5 Criteria for Sewage Treatment Plant discharges**

Parameter	Units	Criteria
pH	s.u.	<b>6-9</b>
BOD <sup>(1)</sup>	mg/L	<b>30</b>
COD	mg/L	<b>125</b>
Total nitrogen	mg/L	<b>10</b>
Total phosphorous	mg/L	<b>2</b>
Oil and grease	mg/L	<b>10</b>
TSS	mg/L	<b>30</b>
Total coliforms	MPN/100ml	<b>400</b>

1) Values are listed as 30-day average/7-day average

Sabajo will operate PWTPs in order to provide sanitary water for domestic use. During construction, a treatment plant will be operated at the Construction Camp. The ESIA has considered the requirement for sanitary drinking water, as listed in Table 4 to establish the design criteria for operation of the PWTPs.

## **6.6 Data Management and Quality Control**

All water monitoring data will be entered into the site environmental database upon receipt from the field or the laboratory. This database is stored on an applications server, which is backed up daily to ensure data security.

QC will include the implementation of field and laboratory blanks, split samples and duplicates. All incoming data will be entered by personnel trained to detect anomalous values. The environmental database is also a key component of the QC program, with inbuilt capability to detect breaches of compliance criteria or operational trigger values and send automated notifications to nominated personnel to review the data and take follow-up actions. Further to this, during construction Newmont Suriname will engage the services of ESS Environment to review and provide improvement advice on the monitoring procedures, methodologies, quality control, instrumentation and data management at Sabajo. Newmont Suriname intends to continue to utilise the services of an independent third party agent, as required, throughout operations to provide advice on the monitoring program to ensure its robustness and integrity.

## **6.7 Reporting**

Surface water reports will be created on a routine basis, with frequency depending on risk and compliance with criteria. Compliance reports will be distributed to site leadership to ensure that Sabajo's leadership team is aware of performance against water quality criteria. It is expected that a final annual summary of water quality monitoring will also be prepared and provided to NIMOS.

The reports will provide the data and an analysis of compliance with the specified criteria. If criteria are exceeded, additional information will be provided on the cause, environmental and/or other impacts and the corrective actions implemented (if required) to achieve compliance.

## **7 SURFACE WATER QUANTITY**

The development of Sabajo will result in changes in the river hydrographs, particularly downgradient of the project facilities in the Commewijne basin. Hydrology is directly impacted by alterations of surface capture areas by the development of the waste rock facilities and pits.

### **7.1 Objectives**

The objectives of measuring surface water quantity are to:

- Meet ESIA commitments for monitoring of surface water stream flows;
- Assess changes in stream hydrology in the river drainage system surrounding Sabajo;
- Maintain data that can be used for engineering support and for development of closure water management plans; and,
- Provide data that can be used to calibrate and update the water balance model.

### **7.2 Monitoring Locations**

As part of the baseline data collection, continuous stream gauging was established at one station, shown in Figure 5:

- CSW-7

During the baseline data collection period, manual flow readings were taken at six locations, also shown in Figure 5 and in Figure 4.7-1 in the ESIA:

- CSW-1, CSW-5, CSW-6, CSW-9, CSW-10

During construction and operations, flows will continue to be measured at CSW-1, CSW-7, CSW-6, and CSW-10. There may be some opportunity to install other continuous stream gaging stations, however given that most of the streams in the area are heavily impacted by ASM, this may be impractical until these streams have been restored/reclaimed.

### **7.3 Parameters and Frequency**

Water quantity is measured at each location by determining the surface water flow, typically in meters per second (m/s).

During the construction of Sabajo, manual flow measurements will be taken weekly at the six locations identified in. Final locations of operational water monitoring stations for flow will be determined as part of the final engineering design stage.

### **7.4 Equipment**

For manual flow measurements, a propeller-type velocity probe known as a Swoffer is used. In addition to measuring flow across the stream sections, the width of the stream at the monitoring locations is measured using a tape measure, and depth is measured using a top-setting rod or equivalent.

## **7.5 Criteria**

Due to the net precipitation climate in Suriname, the changes in surface flows to the drainages around Sabajo are expected to be limited and unlikely to result in significant changes to the surface water flows. Surface water flows in the region of Sabajo have already been significantly altered by the ASM practices.

## **7.6 Data Management and Quality Control**

Water quantity (flow) measurements will be entered into the environmental monitoring database. It is expected that any continuous monitoring stations, proposed to be installed during the operational phase, will use a data logger that will be downloaded on a monthly basis and that data will also be imported into the database. Checks for anomalous data are to be completed as part of the data QC to assess if data collection is reliable, and to interpret results. Calibration of both manual and automated field equipment is completed per the manufacturer's recommendations.

## **7.7 Reporting**

Water quantity data is included in routine water quality reports. Water quantity data will be included in annual reports communicated both internally and externally, as required.

## **8 GROUNDWATER**

The geology of the Sabajo area includes a saprolite clay layer that is up to 100 m deep. While the saprolite is saturated, there is limited groundwater in this zone and precipitation that infiltrates into the sub-surface follows the regional topography and re-appears as surface water at topographic lows. An exception is in areas where there is more extensive quartz veining in the saprolite. These veins are able to hold and convey groundwater, however the volumes are variable. Below the saprolite quartz (SQ) zone is sometimes a transitional zone referred to as saprolite-rock (SR) before the bedrock (BR) zone. In this deeper bedrock zone, there are aquifers and groundwater resources.

Sabajo has the potential to impact groundwater quality and quantity due to seepage and from alteration of the groundwater system as a result of construction of mining facilities (e.g., pits and waste rock storage). Groundwater monitoring will be focused on the WRFs and Ore Stockpile for Sabajo as these are the facilities that have the highest potential for impacting groundwater. Compliance monitoring locations for groundwater are proposed near the surface water compliance monitoring locations.

### **8.1 Objectives**

The primary objectives for monitoring groundwater at Sabajo are to:

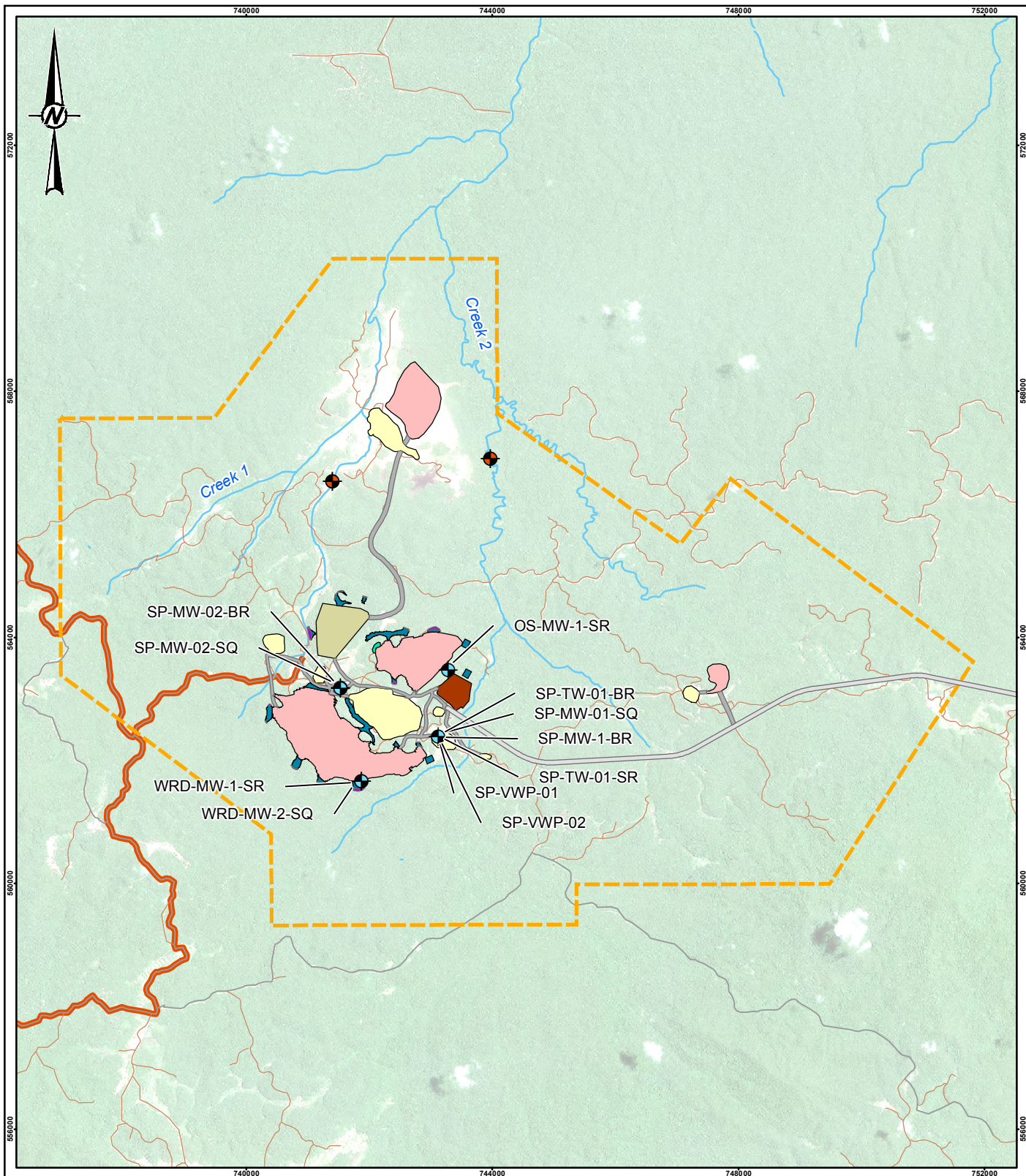
- Plan and implement an effective network of groundwater monitoring wells during construction for monitoring the effectiveness of the control and mitigation measures implemented during construction and operations;
- Comply with ESIA commitments for monitoring seepage from the waste rock facilities;
- Confirm that operational controls and mitigations are effective in managing potential impacts to groundwater;
- Measure groundwater levels to assess changes in the groundwater system, including flow directions and gradients;
- Assess changes in the groundwater system that might result in impacts to connected surface water systems; and,
- Provide data to the mine engineering/operational group to support geotechnical and dewatering assessments.

### **8.2 Locations**

In general, the conceptual hydrogeology in the area is that precipitation that infiltrates into the sub-surface will follow the local topography and discharge into surface water in the valleys. Therefore, the overall strategy for placement of groundwater monitoring wells is to locate them, if possible, up gradient of major facilities (to assess “unimpacted” groundwater conditions), and downgradient of major facilities (to assess potentially “impacted” groundwater conditions). In reality, Sabajo is being developed at the top of the watersheds, so placement of wells up gradient of the facilities is not possible. Final design of some facilities is being completed, so the identification of final locations of monitoring wells (i.e., for some waste rock facilities) will be decided and wells installed in the production phase.

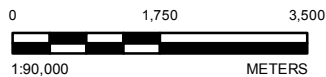
Several groundwater sites were monitored during the baseline monitoring period. These locations are presented in Figure 6.





**LEGEND**

- |   |                             |
|---|-----------------------------|
| — ROAD                                    | PIT                         |
| — LOCAL ROAD                              | STOCKPILE                   |
| — WATERCOURSE                             | WASTE ROCK STORAGE FACILITY |
| WATERBODY                                 | SURFACE FACILITIES          |
| — POTENTIAL PROJECT ACCESS ROAD           | LANDFILL                    |
| EXPLOITATION CONCESSION BOUNDARY          | — ROAD                      |
| PROPOSED GROUND WATER MONITORING LOCATION | — MERIAN TRANSPORT CORRIDOR |
| EXISTING GROUND WATER MONITORING LOCATION | WATER MANAGEMENT BERM       |
|   | WATER MANAGEMENT POND       |



**REFERENCE(S)**

BASE DATA AND TOPOGRAPHY PROVIDED BY NEWMONT. IMAGERY OBTAINED FROM COPERNICUS SENTINEL DATA AUGUST 23, 2017.  
 DATUM: WGS84 PROJECTION: UTM ZONE 21

CLIENT  
**NEWMONT SURINAME**

PROJECT  
**SABAJO PROJECT ESIA**

TITLE  
**BASELINE AND PROPOSED GROUND WATER MONITORING LOCATIONS**

CONSULTANT



YYYY-MM-DD 2018-03-01

DESIGNED GJ

PREPARED PT

REVIEWED GJ

APPROVED GJ

PROJECT NO.  
**1669326**

CONTROL

REV.  
**0**

FIGURE  
**6**

### Environmental and Social Monitoring Plan

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The intent of these locations was to determine pre-production groundwater conditions in the area of the proposed Cassador Pit and the Southern WRF. Prior to construction, these wells will continue to be monitored to collect additional data to support the groundwater model developed for the ESIA. As facilities will be constructed, these locations will be progressively decommissioned and replaced with the Construction/Operations Phase groundwater monitoring program.

For Construction/Operations Phase, groundwater sampling will focus primarily on the following locations:

- GWMP-1 and GWMP -2, which will be located down gradient of the Ore stockpile, and the North and South WRFs at the same locations as the surface water compliance points CSW-6 and CSW-10. As the project design evolves, the exact locations of these stations may change to reflect changes in the engineering design.
- GWMP-3, location near the Cassador Pit (to be determined) based on final pit configuration.

Furthermore, additional monitoring locations may need to be established in support of geotechnical evaluation (e.g., pit wall pressure) and pit dewatering. These locations will be established by the operational group when required to meet their needs.

### 8.3 Parameters and Frequency

The sampling parameters for groundwater are:

- Field: pH, Temperature, Electrical Conductivity, Dissolved Oxygen, Turbidity;
- General Chemistry: TDS, TSS, Alkalinity;
- Nutrients: Nitrate+Nitrite, Ammonia, and Total Phosphorous;
- Major ions: SO<sub>4</sub>, Cl<sub>2</sub>, Mg, Ca, K, Na;
- Organic: Oil and Grease or TPH; and,
- Total metals: Ag, Al, As, B, Ba, Be, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Se, Zn.

If the TSS values are elevated in the wells, this may indicate that the wells have not been sufficiently developed. In that case, additional measures will be undertaken to better develop the well.

Required sampling frequency is bi-annually (e.g., two samplings per year) during construction and then on a quarterly basis during operations.

The measurement for groundwater quantity is depth to groundwater, which will also be measured at the locations specified for groundwater quality monitoring. For each location, the top of the well casing will be surveyed so that the depth to groundwater can be accurately measured. Frequency of measurement will be quarterly.

### 8.4 Equipment

Equipment requirements are generally the same as for Section 6.4 though, to sample groundwater, either a laboratory clean bailer or a peristaltic pump is used to collect water. Protocols for groundwater well sampling have been established for the site and are followed for all sampling. Monitoring of groundwater depth will be completed using an electronic water level indicator with a sufficient spool length to reach the water depth in each well. Measurements will be to the nearest 0.01 m.



## **8.5 Criteria**

Newmont Suriname is committed to meeting the USEPA drinking water criteria for groundwater in the area. The criteria for groundwater is listed in Table 4 Column B.

## **8.6 Data Management and Quality Control**

Data management and QC will be as per Section 6.6. Data will be entered into the site environmental monitoring database upon receipt from the field or the lab. The entered data will be compared to past results to check for anomalous data that is significantly different from past measurements. If that is observed, the wells will be re-sampled for water quality and/or depth to assure that the results are correct.

QC will include field and laboratory blanks, as well as data checking for anomalous values. It is intended that a minimum of a field duplicate and one field blank analysis for every 10 samples collected will be dispatched for analysis.

## **8.7 Reporting**

Groundwater quality reports will be created on a quarterly basis, with a final annual summary also prepared. The reports will provide the data and an analysis of compliance with the specified criteria. If criteria were exceeded, additional information will be provided on the corrective actions implemented (as required) to achieve compliance.

Annual reporting on the monitoring of groundwater depths will also be included in the annual site environmental monitoring report, as well as an assessment of trends in water levels at the different sampling locations.

## 9 GEOCHEMISTRY AND SOILS

Newmont Suriname will complete monitoring of the geochemistry of waste rock and key aspects of soil management. Additional detail on waste rock geochemistry will be included in the Waste Rock and Ore Stockpile Management Plan. For soil, closure aspects are further discussed in the Closure and Reclamation Management Plan and management of hydrocarbon-contaminated soils is discussed in the Spill Prevention, Control, and Countermeasures (SPCC) Plan.

### 9.1 Objectives

In general, geochemical and soil monitoring is associated with assessing and controlling hydrocarbon contamination, peroxide acid generating (PAG) waste rock material and assuring sufficient growth media is available for reclamation. The primary objectives of geochemistry and soil monitoring are to:

- Meet commitments made in the ESIA;
- Assure soil and water protection through appropriate management of hydrocarbon-contaminated soils;
- Ensure that any PAG material intercepted is detected and may be appropriately managed to mitigate impacts;
- Evaluate sufficiency of saprolite growth media for reclamation; and,
- Monitor concurrent and progressive reclamation for soil physical stability and chemistry to support of vegetative growth.

### 9.2 Locations

#### 9.2.1 Hydrocarbon Contaminated Soil

Appropriate management of hydrocarbon spills is required to prevent migration of hydrocarbons past the spill site. Specific procedures for managing spills and the associated clean-up materials and contaminated soils are provided in the SPCC Plan. Hydrocarbon contamination of soil can occur via various mechanisms at Sabajo, and will require monitoring at ad-hoc locations in the event of a hydrocarbon spill which contacts the ground. Primary potential for hydrocarbon contamination is at major hydrocarbon storage or transfer locations, including the following:

- The 1 Mw generator site;
- Maintenance Workshops; and,
- Vehicle Refuelling Bays.

There is also potential for hydrocarbon spills, and therefore ground contamination, as a result of mobile equipment failure or damage and this can occur at any location at Sabajo where vehicles or hydrocarbon-fuelled equipment (i.e., gensets) are active.

Soil monitoring for hydrocarbon contamination will be conducted as needed at designated Volatilization Facilities used to remediate contaminated soil. During construction the Volatilization Facility will be located at the Construction Camp.

#### 9.2.2 Waste Rock Geochemistry

The baseline work completed in support of the ESIA indicated that the overall potential for Acid Rock Drainage (ARD) from waste rock is moderate. The fresh rock samples typically yield the highest PAG

results; as such a water treatment plant for waste rock seepage is currently planned for in the engineering design.

Fresh waste rock will not be intercepted and actively mined until the third year of mining operations (based on the 2017 mine plan). Once waste rock is exposed in the mining areas, a specific monitoring program will be developed to determine the presence, or absence, of PAG material. For saprolite, monitoring for PAG material will be conducted when routine blasting commences if consistent, hard saprolite is encountered. Monitoring locations will be determined based on where material is actively mined, and where any PAG material identified is ultimately disposed. Future updates of the ESMMP will identify the monitoring locations of the PAG material to be managed during mining.

### 9.2.3 Reclamation Materials

As specified in the Closure and Reclamation Plan, Newmont Suriname will conduct both concurrent and final reclamation of disturbance during the mine life and at final closure. Specific planning for the different facilities is included in the Closure and Reclamation Plan, which will be updated throughout the mine life. During the construction phase of the mine, land is actively cleared for facilities to be built as per the design required to operate the mine, and there is no planned reclamation activities during this period.

## 9.3 Parameters and Frequency

### 9.3.1 Hydrocarbon Contaminated Soil

While routine monitoring of soil for potential hydrocarbon contamination is not required, specific monitoring associated with a spill event may be needed. This will be done on an ad-hoc basis and includes:

- Monitoring of the sufficiency of soil clean-up;
- Confirming no impacts to nearby water; and,
- Successful remediation of contaminated soils that have been collected.

Parameters used to identify hydrocarbon contamination are TPH and Oil and Grease. Results are used to determine if a spill has been adequately remediated, or if additional clean-up measures (e.g., removal of additional soil) are required. If the soil has been sufficiently remediated in-situ i.e., following a spill, then the soil remains in the location. If the soil has been sufficiently remediated on a volatilization facility, then it is removed and used as clean fill, placed on the waste rock dump or on reclamation areas.

### 9.3.2 Waste Rock Geochemistry

To confirm the initial testing that was completed as part of the baseline data collection, continued waste rock characterization will be completed during operations once fresh rock material is intercepted and mined. During operations, Acid Based Accounting (ABA) tests will be completed on a minimum of 1 in 200 blast holes.

### 9.3.3 Reclamation Materials

Reclamation monitoring during construction consists of compiling a disturbance register to accurately record the final disturbance footprint of Sabajo which will require reclamation in future phases of the mine life. Data collected during construction includes the specific locations (surveyed coordinates) and size (ha) of each area disturbed.

During operations, monitoring will be completed to confirm that the reclamation material balance is supportive of requirements. The review will calculate the required volume of saprolite material needed for cover to support the Closure and Reclamation Plan. The volume can be calculated by:

$$\text{Area requiring saprolite cover (m}^2\text{)} \times \text{cover depth (m)} \times 120\%$$

The cover depth is specified in the Closure and Reclamation Plan and may be adjusted through time based on actual experience gained during concurrent and progressive reclamation. The equation above includes an additional 20% volume to account for loss of saprolite during storage and placement as a cover growth material.

Routine monitoring of revegetated areas will also be completed with progressive reclamation. If areas demonstrate poor success for revegetation, or the plant growth fails through time, the soils in the area should be analysed for nutrient, chemical and biological properties to see if some soil modification (e.g., fertilization) needs to be completed to support successful revegetation.

## 9.4 Equipment

### 9.4.1 Hydrocarbon Contaminated Soil

Newmont Suriname has a Total Petroleum Hydrocarbon (TPH) field kit (Hach) for completing hydrocarbon contamination testing in soil on-site, however during construction soil samples are typically dispatched to external laboratories for analysis. Soil volatilization facilities are equipped with an Oil/Water Separator (OWS), and the water discharged from the separator will need to meet the criteria specified in Section 9.5.1.

### 9.4.2 Waste Rock Geochemistry

The geochemical testing program for waste rock will use static tests, unless the results of the static test work indicate that additional confirmation testing is needed. The testing will be completed using a LECO analyser installed at the mine site, or by an outside laboratory. The analyses needed are:

- Total Sulphur
- Total Inorganic Carbon
- Hydrochloric extractable sulphur for estimation of sulphate-S

As a conservative measure, sulphide-S can be estimated by subtracting sulphate-S from Total S. The testing must be completed using ASTM standard test method E1915-11.

### 9.4.3 Reclamation Materials

During construction there is no monitoring of reclamation materials and so no equipment is required. This information will be updated in future ESMMP versions to reflect the requirements during future phases of the mine life.

## 9.5 Criteria

### 9.5.1 Hydrocarbon Contaminated Soil

The IFC does not have any guidelines on clean-up levels for soil hydrocarbons. Based on TPH requirements at other operations, proposed limit for acceptable TPH content is:

- TPH in soils - 100 mg/kg

If contaminated soil is moved to a volatilization facility for remediation, the level of 100 mg/kg will be used to determine when soil is sufficiently remediated. Soil that has been sufficiently remediated on a volatilization facility is removed and used as clean fill, placed on the waste rock dump or on reclamation areas. Table 11 outlines TPH limits in treated OWS effluents.

#### 9.5.2 Waste Rock Geochemistry

There are no compliance criteria for waste rock geochemistry monitoring data. However, in the event that the monitoring data indicates that PAG material is intercepted and will be mined, the Waste Rock and Ore Stockpile Management Plan will be reviewed and updated to include specific material classification limits for what is considered PAG and what is Non-Acid Generating (NAG) material, and how each material type will be handled.

#### 9.5.3 Reclamation Materials

As noted above there is no monitoring requirement for reclamation materials during construction, and therefore no criteria against which to assess. This will be updated in future versions of the ESMMP.

### 9.6 Data Management and Quality Control

Monitoring results associated with hydrocarbon contamination, waste rock characterization and reclamation materials quality and inventory will be imported to the environmental monitoring database. Data will be imported by personnel knowledgeable on the subject matter and trained to detect anomalous data.

An Acid-Based Accounting system will be implemented at Sabajo in the event that any PAG material is intercepted, and the results of geochemical monitoring will be maintained in the site geological database.

### 9.7 Reporting

Data relating to hydrocarbon contamination of soils, waste rock characterisation and reclamation materials will be included in annual reports and reported to site leadership as required.

## 10 BIOLOGICAL

The Sabajo mine site may contribute to negative impacts to terrestrial and aquatic biodiversity, including:

- Loss and degradation of habitat for biodiversity from clearing of the project footprint;
- Degradation of habitats adjacent to project footprint originating from activity, noise, light, dust, sediments and the potential introduction of invasive species at the project site;
- Mortality of animals, including from vehicular collisions; and,
- The potential creation of indirect or secondary impacts on biodiversity in the region by catalysing settlement and economic development around the mine.

In the ESIA, several mitigation measures were identified to reduce the impact to biodiversity. Additional discussion of these measures is included in the Biodiversity Action Plan (in progress) and the Closure and Reclamation Plan.

### 10.1 Objectives

The primary objectives of Newmont Suriname's biological monitoring program are to:

- Assess if the established controls and mitigations are effective in achieving protection of terrestrial and aquatic biological resources;
- Provide the basis for the continual improvement and adaptive management of biodiversity mitigation actions if mitigations are less successful than planned; and,
- Confirm that reclamation activities are successful in providing replacement habitat in disturbed areas.

Newmont Suriname's approach to monitoring and mitigating potential risks to biological resources and biodiversity at Sabajo as well as any positive impacts as a result of restoration activities completed by Newmont Suriname focusses on the following:

- Preventing Hunting, Fishing and Collection of Plants and Animals;
- Reducing Wildlife Mortalities and Relocating Low-Mobility Wildlife;
- Revegetation of Disturbed Areas; and,
- Freshwater Aquatic Life Assessments.

Monitoring activities associated with these focus areas are described further below.

### 10.2 Prevention of Hunting, Fishing and Collection of Plants and Animals

Sabajo has policies in place to prevent hunting and fishing and the collection of plants and animals within the RoE for both its direct employees and contractors. Additional details will be included in the Biodiversity Action Plan. The effectiveness of these policies will be monitored during routine environmental inspections of the various work areas. Within the environmental inspection template there is a specific requirement to check work areas for evidence of any of these activities and, if found, points are deducted from the total inspection score and corrective actions are assigned to the work area supervisor to address the issue. To date there has been no evidence of hunting, fishing or

unauthorised removal of plants or animals from Sabajo however, if evidence of this were ever detected, additional training on the policies or other measures may be implemented.

### 10.3 Low-Mobility Wildlife Relocation and Mortality Mitigation

Wildlife mortalities are typically caused either during clearing of forested areas for construction, or as a result of interaction with vehicles travelling along roadways. In the former instance preventative measures are taken to avoid unnecessary wildlife mortalities via the Vegetation Disturbance Permit process, which requires that all forested areas to be cleared are inspected by Environmental Department representatives prior to disturbance. During these pre-disturbance inspections personnel conduct wildlife hazing using loud horns to encourage wildlife to move out of the area. They also specifically search for low-mobility animals (i.e., Sloths, Silky Anteaters, Porcupines) which may not be able to move away from the clearing activities fast enough to avoid being injured or killed. When any low-mobility animals are found in a designated clearing area they are captured and relocated to a forested area nearby which will not be cleared. Several actions are taken to prevent wildlife mortalities as a result of interaction with vehicles including maintenance of road-side vegetation to improve visibility, a site-wide policy for using head-lights at all times and strobe lights in most areas, and strict and conservative speed limits across the site.

Despite all mitigation measures taken, wildlife mortalities can and do occur, and these mortalities are recorded. Mortalities are reported to the Environmental Department, who then identify the species and the probable cause of mortality (if unknown). This information is tracked so that long-term trends may become evident on specific areas or activities that appear to have high potential for wildlife mortalities.

The wildlife mortality monitoring program is designed to provide the empirical basis for managing and minimizing the impact of mining related activities at Sabajo to wildlife and biodiversity. This may also improve worker safety, reduce vehicle repair costs due to collisions with wildlife, and contribute to overall minimization of mine site impacts. If a certain location or activity is identified as resulting in higher rates of wildlife mortalities, adaptive management actions may be implemented to reduce the risk of mortalities. This may include actions such as: reducing vehicle speeds in a certain area, using fencing or other barriers to prevent wildlife access to facilities, and additional training and/or education of site workers.

Reporting of wildlife mortalities will be included in annual environmental reports. These reports should also note any corrective actions undertaken and if these adaptive management measures are successful in reducing wildlife mortalities.

### 10.4 Re-Vegetation of Disturbed Areas

Both concurrent and final reclamation programs are included in the Closure and Reclamation Plan for Sabajo. However, during the construction phase of the mine life, revegetation effort is focused primarily on re-establishing vegetation where possible in the various catchments to assist to stabilise exposed areas and mitigate erosion and sediment control risk. As such, revegetation priorities are for the establishment of rapid-growth, colonizing ground cover species, some of which have extensive root systems to assist in slope stabilisation and water energy dissipation.

Monitoring during construction is therefore designed to assess the effectiveness of revegetation methods separately and combined with other erosion and sediment control best management practices, at reducing erosion on cleared areas and reducing as much as possible sediment loading in surface water run off as indicated by TSS monitoring. Monitoring results are reviewed frequently with site leadership and, where data indicates that revegetation is not meeting expectation, corrective actions are assigned to drive continuous improvement.



### Environmental and Social Monitoring Plan

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Once into the operational phase, reclamation will commence and short-term monitoring will be implemented for concurrent reclamation activities. This monitoring will be used to optimize reclamation, including such aspects as material content, reclamation material placement thicknesses and vegetation species assemblages, as based on the monitoring results and the criteria specified in the Closure and Reclamation Management Plan.

A long-term reclamation monitoring program will be developed during operations to monitor results achieved during closure over a longer period of time to ensure that those results will remain viable in the longer term, and to help optimize reclamation techniques. If problems are noted by either program, measures will be undertaken to identify and implement alternative approaches to improve the reclamation success.

Both the short-term and long-term reclamation monitoring programs will ensure that the following parameters are addressed:

- Soil physical and chemical properties if reclamation of an area is not successful;
- Soil flora to be checked for deficiency if reclamation of an area is not successful;
- Erosion and corrective measures;
- Vegetation establishment to be tracked using visual techniques;
- Vegetation growth and cover to be tracked using visual techniques;
- Vegetation health to be tracked using visual techniques;
- Vegetation diversity to be tracked using visual techniques and field observations; and,
- Comparability of reclaimed communities to natural analogues as based on field observations.

Among the indicators to be measured and tracked are:

- Area (Ha) reclaimed each year and a tracking system that denotes the spatial area and date that revegetation was completed;
- Photographic or other visual means of tracking vegetation success;
- Field tracking of erosion and development of successional plant communities; and,
- As required due to revegetation failure, documentation of soil and flora sampling results and what corrective actions were implemented.

On an annual basis, it is intended that a summary of the monitoring results will be included as part of the annual environmental report. This summary will include:

- Documentation of the locations and size of areas reclaimed as well as location and size of new areas of disturbance;
- Areas where revegetation was unsuccessful and the measures implemented to establish successful vegetation;
- Tracking of revegetation through time to assess successional changes in the plant communities and trajectory towards analogous pre-mining habitats; and,
- Areas with significant erosion and corrective measures implemented.

## **10.5 Freshwater Aquatic Life Assessments**

As documented in the ESIA, the streams in and around the site were characterized by a team that was headed by Jan Mol of the Anton de Kom University of Suriname. In general, the fish communities documented were reported to be very typical of the interior of Suriname.

As the biodiversity impact assessment includes the potential restoration of ASM affected stream reaches (Section 5.8.5.2 of the ESIA) as a mitigation for biodiversity impacts, the one stream in the area that has not been impacted by ASM activities will be monitored on an annual basis to collect baseline data regarding relatively unimpacted stream health in the project area (CSW-7 can be considered a reference stream, Figure 5). This location currently has low pH and dissolved oxygen and high turbidity, so it is indicative of the stream conditions that can support aquatic life that may fall outside the “normal” aquatic life stream quality as defined by the USEPA or the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME 1999).

## 11 WASTE

A variety of waste is generated at Sabajo with the potential to impact human health and the environment. Waste can impact fauna, soils and groundwater, create odor and pest problems, can be aesthetically detracting and generate concern amongst personnel and the wider community. Landfills also occupy land which impacts future land use options. Leading practice management aims to reduce waste generation by characterizing waste streams so they can be re-used, recycled or disposed at the appropriate facility. This section discusses the plan for continued monitoring of waste data.

### 11.1 Objectives

The principal objectives of the waste monitoring program at Sabajo are to:

- Determine quantities and types of waste generated by Newmont Suriname activities;
- Allow waste data to be documented in annual reporting; and
- Review performance to promote recycling and reduce waste to landfill.

### 11.2 Locations

Major waste facilities at Sabajo are:

- **Recycling Laydown Area:** The recycling laydown area is located at the Construction Camp. This facility is equipped with containers for temporary on-site storage of plastic bottles, electronic waste, paper and scrap metal.
- **Waste Collection Facility:** This waste facility is located at the Sabajo Exploration Camp. This facility is equipped with a shed for storage of hazardous and non-hazardous waste as well as a volatilization pad for treatment of contaminated soil.
- **Non-Hazardous Waste Disposal Facility (Landfill):** This facility is located in the footprint of the South WRF and has three pits designated for Common Garbage, Food Waste, and Sewage Sludge.
- **Temporary Hazardous Waste Disposal Facility:**

### 11.3 Parameters and Frequency

Waste monitoring measures the following parameters:

- Total Hazardous waste disposed or recycled off-site (tons);
- Total Hazardous waste disposed or recycled on-site (tons);
- Total Non-Hazardous waste recycled off-site (tons);
- Total Non-Hazardous waste disposed on-site (tons); and
- The proportion of generated waste which was either recovered (re-used or recycled) or not recovered (landfilled or incinerated).

These parameters are measured as the waste is generated.

### 11.4 Criteria

There are no specific compliance criteria for waste monitoring applicable to Sabajo. However, internal targets are set to reduce waste to landfill and drive continual improvement.

## **11.5 Data Management and Quality Control**

Waste generated at Sabajo is tracked through the Waste Disposal Form for waste disposed at Sabajo waste management facilities and the Waste Delivery Form for waste that is delivered at off-site waste disposal facilities, including off-site recyclers and disposal vendors.

Waste data is entered into a database and reviewed by the Environmental Assistant Superintendent on a monthly basis for accuracy.

## **11.6 Reporting**

The percentage of waste recovered (recycled or re-used) is included in the monthly Environmental Dashboard. The Annual Environmental and Social Report summarises waste management activities and records by waste type and disposal location.

## 12 MONITORING OF SOCIAL COMMITMENTS AND PROGRAMS

As described in the ESIA (Golder 2018), the impacts and risks related to the Sabajo mine that may potentially affect local people both positively and negatively include:

- Increased employment and income generating opportunities;
- Support Community Initiatives;
- Transmission of communicable diseases;
- Increased burden of chronic diseases;
- Exposure of stakeholders to environmental health hazards;
- Changes in land use
- Exposure of workforce to insufficient occupational health and safety or labor and accommodation standards;
- Reduction in standard of living due to reduced productivity of income generating opportunities related to artisanal and small-scale mining;
- Cultural change
- Decreased sense of community safety and psycho-social well-being;
- Increase in accidents and injuries along the transportation corridor; and

Several measures were identified in the ESIA to manage Sabajo's negative social impacts and to enhance its benefits. These include:

- Engaging regularly with project stakeholders;
- Implementing the feedback mechanism (i.e., complaints and grievance process) for employees and community members;
- Prioritizing local hiring and procurement of goods and services, where possible;
- Developing an Emergency Response Plan; and
- The Sabajo project's social monitoring program is designed to track and evaluate the implementation and the effectiveness of these and other measures identified in the ESIA as well as track the project's contribution to community development.

The Sabajo project's social monitoring program is designed to track and evaluate the implementation and the effectiveness of these and other measures identified in the ESIA as well as track the project's community investment activities.

### 12.1 Objectives

The primary objectives of Sabajo's social monitoring program are to:

- Assess the timeliness of the implementation of the activities of the project's social responsibility programs;
- Ascertain if the established measures are effective in addressing the project's potential adverse impacts on affected communities and stakeholders;

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- Provide the information and lessons learned necessary to undertake any adjustments to the project's social responsibility programs to ensure their effectiveness; and
- Track contributions to community development and evaluate their effectiveness.

The following sections outline some of the monitoring activities that will be undertaken by Newmont Suriname. A Social Management Plan (SMP) has been developed to describe mitigations, monitoring and reporting in detail.

#### 12.1.1 Increased Employment and Income Generating Opportunities

Newmont Suriname is committed to prioritizing the employment of and acquisition of goods and services from the key stakeholder groups, insofar as local skills and capacities meet the project's demands and standards for labor, goods and services. Furthermore, Newmont Suriname works to identify promising employees.

The principal objectives of monitoring local employment and income generating opportunities at Sabajo are to:

- Demonstrate the economic benefits to local stakeholders of Newmont Suriname's presence; and
- Identify if additional measures are needed to ensure the effectiveness of Sabajo's employment and income generation activities in the key stakeholder groups.
- The following parameters will be monitored annually<sup>2</sup>:
- Percent of key stakeholder employees during construction (as a percent of the total direct workforce);
- Percent of key stakeholder employees during operations (as a percent of the total direct workforce);
- Number of key stakeholders promoted each year;
- Number of tenders won by local entrepreneurs; and
- Value of tenders won by local entrepreneurs.

#### 12.1.2 Community Health

A Rapid Health Impact Assessment (HIA) was conducted by International SOS (ISOS) in November 2017. It draws on desktop research of secondary data from various government and non-government sources, review of environmental and social data, community profiling and key informant interviews

The following health issues were considered in the context of potential Project effects. Each was studied, screened and given a priority ranking based on the level of community concern, baseline conditions (Section 4.12) and the potential effects of the Project. Issues considered include:

- Issue 1: Vector-Related diseases
- Issue 2: Zoonotic diseases

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<sup>2</sup> Information corresponding to the construction phase will only be monitored during that phase. Similarly, information corresponding to the operations phase will only be monitored during operations.

- Issue 3: Housing and Respirator Issues.
- Issue 4: Sexually transmitted infections
- Issue 5: Diseases related to soil, water, sanitation and waste
- Issue 6: Consumption and nutrition related issues.
- Issue 7: Accidents and Injuries.
- Issue 8: Exposure to potentially hazardous material.
- Issue 9: Social determinants of health.
- Issue 10: Cultural health practices..
- Issue 11: Health Service infrastructure and capacity.
- Issue 12: Non-communicable diseases.

All issues with priority rankings of moderate and high have been carried forward to the impact assessment. Four health issues were identified as most relevant (moderate or high) to the Sabajo Project:

- Vector –Related Diseases;
  - Sexually Transmitted Infections;
  - Accidents and Injuries (traffic related); and
  - Non-Communicable Diseases.
- The principal objectives of monitoring Newmont Suriname’s efforts to manage the community health issues above are to:
- Determine if the measures committed to in the ESIA have been implemented; and
  - Identify if additional measures are needed to ensure the effectiveness of Sabajo’s activities.

Newmont Suriname will track incidence of each type of illness and injury on site.

### 12.1.3 Exposure of Stakeholders to Environmental Health Hazards

The transport of dangerous goods, handling of hazardous materials, potential for impacts to water, flora and / or fauna downstream from the project and other similar situations pose potential risks to stakeholders. The ESIA has defined a number of specific management measures to address these risks, and Newmont Suriname has developed an Emergency Response Plan to involve and inform local authorities and communities in the event of an environmental health hazard scenario.

The principal objectives of monitoring Sabajo’s activities in this regard are to:

- Determine if the established measures are effective in mitigating the risk of exposure to environmental health hazards; and
- Identify if additional measures are needed to ensure the effectiveness of the established measures.
- The following parameter will be monitored annually:



- Status of implementation of the Emergency Response Plan; and
- Other parameters to be defined in relation to the specific risk scenarios (e.g., surface water monitoring, ground water monitoring, air quality monitoring, etc.).

#### 12.1.4 Exposure of workforce to insufficient occupational health and safety or labor and accommodation standards

Construction of the project has required Newmont Suriname to employ, directly and through subcontractors, at peak times approximately 300 employees (although not all will be on site at any one time). Mining and processing involves some inherent dangers. To mitigate this risk to employees and subcontractors, Newmont Suriname has committed to a number of corporate policies and standards and specific management measures, all of which are described in the ESIA.

The principal objectives of monitoring Sabajo's activities in this regard are to:

- Determine if the established measures are effective in mitigating the risks to workers; and
- Identify if additional measures are needed to ensure the effectiveness of the established measures.
- The following parameters will be monitored annually:
- Status of implementation of audits of subcontractors for adherence to health and safety or labor and accommodation standards; and
- Any formal grievances received from the workforce regarding health and safety issues and labor and accommodation standards.

#### 12.1.5 Increased Burden of Chronic Diseases

In addition to the health issues identified in 12.1.2, Newmont is aware of the potential for indirect health effects as a result of changes in socio-economic status and incomes. While the project can contribute to enhanced economic well-being for workers and their households, this higher standard of living may contribute to behavioral risk factors for many chronic diseases such as increased use of alcohol and cigarettes and consumption of unhealthy foods. Because of the complex factors that contribute to a person's risk for chronic disease (including genetics), the project is unlikely to directly increase the burden of chronic diseases in the population. Rather, the project can potentially contribute to behavioral risk factors for chronic diseases, such as by providing only unhealthy (e.g., high fat, high salt) food options at the mine site or failing to provide exercise facilities. Newmont Suriname has defined a number of mitigation measures in the ESIA to mitigate the project's direct contribution to these behavioural risk factors.

The principal objectives of monitoring Sabajo's activities in this regard are to:

- Determine if the measures committed to in the ESIA have been implemented; and
- Identify if additional measures are needed to ensure the effectiveness of the established measures.
- The following parameters will be monitored annually:
- Any formal grievances received from the workforce regarding health issues;

- Status of provision of healthy food choices; and
- Status of implementation of exercise room and other recreational activities.

#### **12.1.6 Reduction in standard of living due to reduced productivity of income generating opportunities related to small-scale mining**

As described in the ESIA, Sabajo's activities in areas previously mined by small-scale miners has impacted the income levels and standard of living of small-scale miners and of those who derive their livelihoods from selling goods or services to these miners. Sabajo has committed to undertaking a variety of measures to mitigate these impacts as described in the Environmental and Social Management and Monitoring Plan.

The principal objectives of monitoring Sabajo's efforts with regard to small-scale miners are to:

- Determine if the measures committed to in the ESIA have been implemented; and
- Identify if additional measures are needed to ensure the effectiveness of Sabajo's activities with regard to the management of this impact.
- The specific parameters to be monitored may change as the program is executed, old activities are retired and new activities are added. The following is an illustrative list of the types of parameters which may be monitored:
- Status of implementation of the Artisanal and Small-Scale Miner Policy and Strategy; and
- Number of small-scale miners involved in Newmont Suriname-supported efforts for more efficient and more environmentally friendly mining techniques.

#### **12.1.7 Decreased sense of community safety and psycho-social well-being**

ESIA-phase focus group discussions in Afobaka and Carolina communities revealed concerns over a potential increase in traffic impacts. Newmont Suriname will monitor these topics.

The principal objectives of monitoring Sabajo's activities in this regard are to:

- Ascertain whether these issues do end up affecting communities; and
- Identify measures needed to address them if they do affect communities.
- The following parameters will be monitored annually:
- Any community complaints received; and
- Any formal grievances received from the workforce relating to stress-related issues.

#### **12.1.8 Increase in accidents and injuries along the transportation corridor**

Newmont Suriname recognizes that increased traffic along the transportation corridor may pose an increased risk of accidents and injuries. The ESIA defined a number of management measures to address this risk and included a specific Traffic and Transportation Safety Management Plan for this purpose.

The principal objectives are to:

- Verify the implementation of the specific actions of the Plan; and

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- Evaluate the effectiveness of the Plan's strategies and adjust them as necessary.
- The following parameters will be monitored annually during operations:
- Number of minor accidents involving project vehicles along the Transportation Corridor (i.e., no injuries, minor property damage);
- Number of major accidents involving project vehicles along the Transportation Corridor (i.e., personal injuries requiring medical attention, major property damage);
- Number of fatal accidents involving project vehicles along the Transportation Corridor; and
- Any formal grievances received regarding project vehicles.

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